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PURCHASE OF MANHATTAN ISLAND
By Peter Minuet 1626

. . . Fulfilment of . . .

Three Remarkable Prophecies

in the History of

The Great Empire State

Relating to

The Development of

Steamboat Navigation . . .

and Railroad Transportation

1808-1908

BY HENRY WHITTEMORE

Author of Past and Present of Steam Navigation
on Long Island Sound, etc.

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PROPHECY OF JOHN FITCH

John Fitch, who began his experiments as a steamboat inventor in 1785 wrote to his friend Rittenhouse, in June, 1792, saying:

"It would be much easier to carry a first-rate man-of-war by steam than a boat, and we would not be cramped for room, nor would the weight of machinery be felt. THIS, SIR, WILL BE THE METHOD OF CROSSING THE ATLANTIC WHETHER I BRING IT TO PERFECTION OR NOT." On another occasion he said:

"Well, gentlemen, although I shall not live to see the time, you will, when steamboats will be preferred to all other means of conveyance, and especially for passengers, and they will be particularly useful in the navigation of the Mississippi." The following statement was found in his journal after his death: "The day will come when some more powerful man will get fame and riches from my invention, but nobody will believe that poor John Fitch can do anything worthy of attention."

PROPHECY OF OLIVER EVANS

Oliver Evans, inventor of the "Eructor-Amphibiolis"—steamboat and steam carriage combined—said:

"The time will come when people will travel in stages moved by steam engines from one city to another almost as fast as birds fly, *fifteen or twenty miles an hour.* Passing through the air with such velocity; changing the scene in such rapid succession will be the most exhilerating exercise. A carriage (steam) will set out from Washington in the morning; the passengers will breakfast at Baltimore, dine at Philadelphia, and sup in New York the same day. To accomplish this two sets of railways will be laid, so nearly level as not in any way to deviate more than two degrees from a horizontal line, made of wood or iron, or smooth paths of broken stone or gravel with a rail to guide the carriages, so that they may pass each other in different directions and travel by night."

PROPHECY OF WILLIAM C. REDFIELD

William C. Redfield of Cromwell, Conn., who introduced the system of tugboats on the Hudson as a means of preventing the loss of life from the explosion of passenger boats, wrote a pamphlet in 1829, predicting the rapid settlement of the Western States, the magic development of their agricultural and mineral wealth, and the consequent rapid growth of our great commercial metropolis." The route proposed was substantially that of the New York and Erie Railroad, but his views extended still further and he marked out with prophetic accuracy the course of the railroads which would connect with the Atlantic States the then infant States of Michigan, Indiana and Illinois. Ohio being at that time in a comparatively advanced stage of civilization and settlement. These, he foresaw would advance with incredible rapidity the settlement of those regions of unbounded fertility, and would divert no small portion of the trade from Mississippi to the great metropolis of the East. He had even anticipated that after the construction of the proposed great trunk railways connecting the Hudson and the Mississippi, many lateral railways would bind in one vast network the whole great West to the Atlantic States. Said he, "This great plateau will indeed be one day intersected by thousands of miles of railroad communication, and so rapid will be the increase of its population and resources that many persons now living will probably see most or all of this accomplished."

In confirmation of the above another writer says: "The railroad is the pioneer of civilization. It plows its way through the dense forest, the unbroken prairie, or the waterless and almost deserted lands, and at every mile of its onward progress a village springs up, farms are laid out, orchards planted, the fields wave with golden grain, and presently mines, manufactories, schools, colleges and churches are called into existence all along the line. These enterprises increase the national wealth in an almost incredible degree."

CHAPTER I

EARLY EXPERIMENTS IN STEAMBOAT NAVIGATION

"The invention all admired, and each how he
To be the inventor missed; so easy it seemed;
Once found, which yet unfound most would have thought
Impossible."

The inventive genius of America, which had long remained dormant, owing to the restrictions placed on the American colonies by the Mother Country was immediately called forth when the colonies achieved their independence, and one of the first enterprises to engage the attention of inventors was that of steam navigation. The honor of the discovery of the application of steam power for propelling vessels has many claimants, and of these claims set forth in the following pages the reader must form his own judgment as to which is the strongest, and as to who is entitled to the highest honor.

John Fitch, if not the first inventor is certainly entitled to the claim of *originality,* for he says in his autobiography: *"I did not know that there was a steam engine on earth when I proposed to gain a force by steam".* Dr. Thornton, of the Patent Office at Washington, in a publication entitled "A Short Account of the Origin of Steamboats," says:

"In the year 1788 the late John Fitch applied for and obtained a patent for the application of steam to navigation, in the states of New York, Pennsylvania, New Jersey, Delaware, etc.; and soon after, the late Mr. James Rumsey, conceiving he had made some discoveries in perfecting the same applied to the State of Pennsylvania for a patent; but a company formed by John Fitch, under his State patents, of which the author of this was one of the principal shareholders, conceiving that the patent of Fitch was not for any peculiar mode of applying the steam to navigation, but that it extended to all modes of propelling boats and vessels, contested before the Assembly of Pennsylvania, and also before the Assembly of Delaware, the mode proposed by Mr. Rumsey, and contended that the mode he proposed, viz: by drawing up the water into a tube, and forcing the same water out of the stern of the vessels or boat, which was derived from Dr.

Franklin's works (the Doctor being one of the Company), was a mode the Company had a right to, for the plan was originally published in Latin about fifty years before, in the works of Bernouille the younger. Two of Fitch's Company and I appeared without, and pleaded our own cause in the Assembly of Pennsylvania, and after a week's patient hearing against the most learned counsel of Pennsylvania, we obtained a decision in our favor, and afterwards also in Delaware. We believed and contended that our claims for propelling boats by steam included all the modes of propelling vessels and boats then known, and that the patent was for the application of steam as an agent to the propelling powers; and the decisions of the legislatures were in favor of this construction, as Mr. Rumsey's company (of which the late Messrs. Bingham Myers, Fisher, and many other worthy gentlemen were members) were excluded from the right of using steamboats on any principle."

At a special meeting of the American Philosophical Society of Philadelphia, held Sep. 27, 1785, Fitch laid before it a drawing and description of a machine for working a boat against the current by means of a steam engine; and on the 2d of December following presented a copy of the model and drawing to the Society. This was constructed with wheels at the sides, but these being found to labor too much in the water, were replaced by his experiments of July, 1786, a new model with a three-inch cylinder, and applied to a small skiff. With this machinery trials were made on the Delaware about July 20th, 1786, with a "screw of paddles", a screw propeller, the endless chain, and the side-wheels without much success. The next night as he lay in his bed Fitch evolved a plan of rowing the boat by oars or paddles on the sides to be moved by cranks worked by machinery. He immediately drew a plan, and the following day submitted it to Henry Voight, an engineer clock and watchmaker, who approved of it with some slight changes. This was afterwards tried on the skiff with the steam engine, and, as is claimed, the first boat successfully propelled by steam in America was moved in the Delaware on July 27th, 1786, to the entire satisfaction of all who witnessed the experiment.

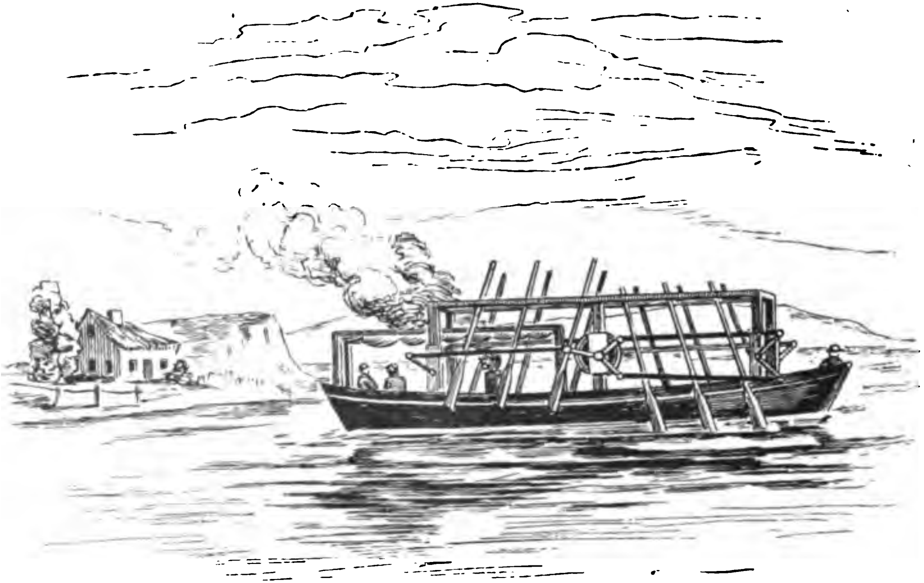
Fitch formed a company in 1786-7, dividing the stock into forty shares. Meanwhile, in 1786, the State of New Jersey, and in 1789, New York, Delaware and Pennsylvania and Virginia had granted him the sole and exclusive right to their waters for fourteen years, for purposes of navigating boats by means of steam. He immediately began the construction of a new boat of sixty tons, 45 feet long, and 12 feet beam, with six oars or paddles on each side, and an engine of 12 inch cylinder. The Columbian

(Philadelphia) Magazine for 1786, gives the following description:

"The cylinder is to be horizontal, and the steam to work with equal force at each end. The mode by which we obtain a vacuum is, it is believed, entirely new, as is also the method of letting the water into it and throwing it off against the atmosphere without any friction. It is expected that the cylinder, which is twelve inches in diameter, will move a clear force of eleven or twelve cwt., after the frictions are deducted; this force is to be directed against a wheel eighteen inches in diameter. The piston is to move about three feet, and each vibration of it gives the axis about forty revolutions. Each revolution of the axis moves twelve oars or paddles five and a half feet; they work perpendicularly, and are represented by the strokes of a paddle of a canoe. As six of the paddles are raised from the water six more are entered, and the two sets of paddles make their strokes of about eleven feet in each revolution. The crank of the axis acts upon the paddles about one-third of their length from their lower ends, on which part of the oar the whole force of the axis is applied. The engine is placed in the bottom of the boat about one-third from the stern, and both the action and reaction turn the wheel the same way."

Dr. Thornton in his account, says: We worked incessantly at the boat to bring it to perfection, and under the disadvantages of never having seen a steam engine on the principle contemplated, of not having a single engineer in our company or pay—we made engineers of common blacksmiths and after expending many thousand dollars, the boat did not exceed three miles an hour. Finding great unwillingness in many to proceed, I proposed to the company to give up to any one the one-half of my shares who would at his own expense, make a boat to go at the rate of eight miles an hour, in dead water, in eighteen months, or forfeit all the expenditures on failing; or I would engage with any others to accept these terms. Each relinquished one-half of his shares by making the forty shares eighty, and holding only as many of the new shares as he held of the old ones, and then subscribed as far as he thought proper to enter on the terms, by which many relinquished one-half. I was among the number, and in less than twelve months we were ready for the experiment.

"The day was appointed [Aug. 22d, 1787] and the experiment made in the following manner: A mile was measured in Front (Water) street, Philadelphia, and the bounds projected at right angles as exactly as could be to the wharf, where a flag was placed at each end, and also a stop watch. The boat was ordered under way at dead water, or when the tide was found to be with-



JOHN FITCH'S STEAMBOAT 1788

out movement; as the boat passed one flag it struck, and at the same instant the watches were set off; as the boat reached the other flag it was also struck; and the watches instantly stopped. Every precaution was taken before witnesses, the time was shown to all; the experiment declared to be fairly made, and the boat was found to go at the rate of *eight miles an hour;* or one mile in seven minutes and a half; on which the shares were signed over with great satisfaction by the rest of the company. It afterwards went eighty miles in a day."

The National Convention for framing the Federal Constitution which was then in session in Philadelphia adjourned to witness the experiment. Among the number was General Alexander Hamilton and many distinguished men from various parts of the country.

"The Governor and Council of Pennsylvania," says Dr. Thornton, "were so highly pleased with our labors, that, without their intention being previously known to us, Governor Mifflin attended by the Council in procession, presented to the company, and placed in the boat, a superb silk flag, prepared expressly, and containing the arms of Pennsylvania." Certificates of the perfect success of this attempt were given by Governor Randolph, of Virginia, Dr. Johnson, of the same State, David Rittenhouse the astronomer, Andrew Ellicott, professor in the Episcopal Academy, and Dr. John Ewing, of the University. The Certificate of David Rittenhouse is as follows:

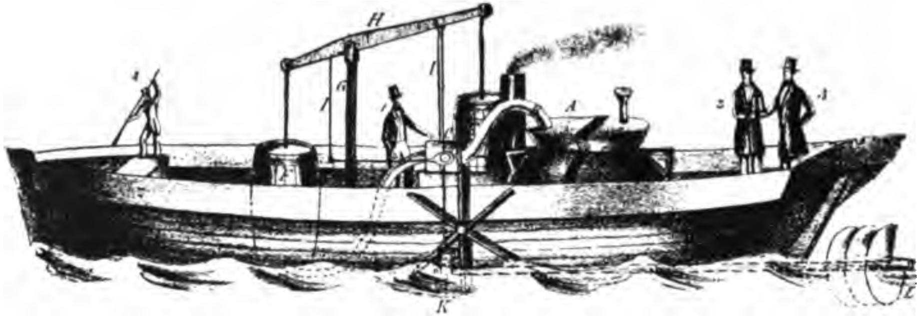
"This may certify that the subscriber has frequently seen Mr. Fitch's steamboat, which, with great labor and perseverance he has at length completed; and has likewise been on board when the boat was worked against both wind and tide with considerable velocity by the force of steam only. Mr. Fitch's merits in constructing a good steam engine, and applying it to so useful a purpose, will no doubt meet with the encouragement he so richly deserves from the generosity of his countrymen, especially those who wish to promote every improvement of the useful arts in America."

Fitch constructed a larger boat in 1788, and still another in 1791. This was run during the whole summer as a passenger boat between Philadelphia and Burlington, New Jersey, with a speed of eight miles an hour. Another boat, the Perseverance, designed for both freight and passengers on the Mississippi river, under the Virginia patent, which gave Fitch the exclusive right of navigating the Ohio river and its tributaries.

In 1793 Mr. Fitch was sent to France by the Company at the request of Aaron Vail, Esq., then United Sates Consul at L'Orient, who being one of the Company, was solicitous to have steamboats built in France, but owing to the revolution then in progress, and the difficulty of obtaining workmen, nothing was done. Fitch went to London, leaving his plans and specifications with Mr. Vail.

On his return from his unsuccessful trip, Fitch landed at Boston in a very needy and destitute condition. Col. George King of Sharon, Conn., a relative, hearing of his friendless situation, sent for him, and generously offered him a home under his roof.

In the summer of 1796 Fitch came to New York, where he made his last attempt to demonstrate the practicability of steam navigation. His experiments were made on the Collect Pond, a considerable body of water which covered the site of the present Tombs Prison on Centre Street. The pond was about sixty feet deep and covered quite an area partly surrounded by trees. Fitch obtained a ship's yawl boat about eighteen feet long. He constructed his machinery and fittings and attached them to his diminutive craft. The boiler was a ten or twelve gallon iron pot with a lid of thick plank firmly fastened to it by an iron bar placed transversely. The cylinder was of wood, barrel shaped on the outside, and straight on the inside, strongly hooped The main steam pipe led directly from the boiler top into a copper box (about six inches square) receiver, or valve box. The leading pipes led separately into the bottom or base (the one short cylinder F and longer one E) separate cylinders; and each piston rod was attached to the extremites of the working beam. This beam was supported by an iron upright, the connecting rod was so arranged as to turn the crank of the propelling shaft which passed horizontally through the stem of the boat, and was made fast to the propeller or screw as at L. The valves were worked by a simple contrivance attached likewise to the working beam as will be easily seen and understood by reference to the accompanying illustration. This is taken from a working model now in possession of the New York Historical Society. This was made and the description given by John Hotchkiss, who was a boy assistant with Fitch at the time, and was made by him from memory many years after Fitch's death. Hutchins' memory was evidently defective in some respects as the model shows two side-wheels with six blades as well as a screw propeller in the stem. The boat was started from the bow. Hutchins mentions among those who witnessed his experiments and made trial trips with him, Col. John Stevens, Robert R. Livingston and Robert Fulton. The latter could not have been present as he was then, and had been for many years residing abroad. Fitch's boat attained a speed of about six miles an hour, two miles less than he made with his boat equipped with oars on the



John Fitch Born in Conn^t 21th of June 1743. First we find him a farmers boy, next an apprentice to a Watch-maker, then in a store at Trenton N.J with a stock valued at 3000 doll^s all of which was destroyed, when the British took Trenton next a Lieutenant in the A Army, taken prisoner by the Indians, and sold from one tribe to another through the N.W. Territory, until he was purchased by an Englishman and thus obtained his freedom. During this time he became acquainted with that part of the country of which he made a map, and although printed on a common Cider press it had an extenive sale. He was then a Surveyor in Kentucky, then a Civil Engineer in P^a and on the Delaware made his first experiment of a Steam-Boat with Paddles, he then left America, and traveled through France and England, but not meeting with the encouragement anticipated, became poor and returned home, working his passage as a common sailor to Boston, from there to his native town in Connecticut, thence to New York, where he passed some time then back to Kentucky where he died in 1798

Delaware river some years previous. Thus his final experiment was a failure, for Chancellor Livingston would not invest in any system of steam navigation that could not accomplish at least eight miles an hour.

The boat, together with a portion of its machinery, was abandoned by Mr. Fitch, and left to decay on the muddy shore of the Collect Pond, and was carried away piece by piece by the children of the neighborhood for fuel. In the autumn of 1796 Fitch went to Kentucky to obtain possession of some lands which he had purchased while surveying there. He obtained writs of ejectment against certain persons illegally occupying them, and just as a better day was dawning upon the career of this singularly unfortunate man he was taken sick with a fever and died.

In conformity with his expressed wishes he was buried on the shores of the Ohio river that he might repose "where the song of the boatman would enliven the stillness of his resting place, and the music of the steam engine soothe his spirit."

Regarding the time and place of his birth, Fitch says: "The 21st of January, 1743, old style was the fatal time of bringing me into existence. The house I was born in was upon the line between Hartford and Windsor (Connecticut). It was said I was born in Windsor; but from the singularity of my make, shape, disposition and fortune in the world, I am inclined to believe that it was the design of Heaven that I should be born on the *very line* and not in any township whatever; yet am happy also that it did not happen between two states, that I can say I was born somewhere."

In his account of his experiments in steam navigation, Fitch says: "In the month of April, 1785, I was so unfortunate as to have an idea that a carriage might be carried by the force of steam along the roads. I pursued that idea about a week and gave it over as impracticable, or in other words, turned my thoughts to vessels. From that time I have pursued the idea to this day with unremitted assiduity, yet do frankly confess that it has been the most impudent scheme that I ever engaged in. The perplexities and embarrassments through which it has caused me to wade, far exceed anything that the common cause of life ever presented to my view, and to reflect on the disproportion of a man of my abilities to such a task, I am to charge myself with having been deranged, and had I not the most convincing proofs to the contrary should most certainly suppose myself to have been *non compus mentis* at the time."

No monument marks the last resting place of poor John Fitch, but he will be remembered as one of the great inventors and pro-

JOHN FITCH'S LAST STEAMBOAT
Excursion on the Collect Pond, New York City

motors who sought to advance the cause of civilization by making use of the best gifts with which Nature endowed him.

Fitch never lived to witness the successful efforts of Fulton and Livingston in steam navigation. When he returned to Kentucky in the autumn of 1796 he abandoned all further experiments along the lines to which he had given the best years of his life, and gave his whole attention to reclaiming lands which he had acquired in early life.

His remains were interred in the village graveyard at Bardstown, Nelson County, Kentucky, in the rear of the court-house and county jail in 1798, but there is not a mound or a stone to mark the spot where his remains were buried. His last will is on record, which was copied by a correspondent of the Philadelphia *Evening Telegraph,* as follows:

"I, John Fitch, of the County of Nelson, do make this my last will and testament. To William Rowan Esq., my trusty friend, my beaver hat, shoe, knee, and stock, buckles, walking stick and spectacles. To Dr. William Thornton of the City of Washington, in the District of Columbia. To Eliza Vail, daughter of Aaron Vail, Consul of the United States, at L'Orient. To John Rowan Esq of Beards Town, son of said William, and to James Nourse Esq., of said town. I bequeath all the rest of my estate, real and personal, to be divided amongst them, share and share alike; and I appoint the said John Rowan Esq., and James Nourse Esq., my executors, and the legatees hereby bequeathed to them my said Executors, is in consideration of their accepting the Executorship, and bringing to a final close all suits at law, and attending to the business of the estate hereby bequeathed. Hereby declaring this my last will and testament this 20th day of June, One Thousand Seven Hundred and ninety-eight.—Witness my hand and seal.

John Fitch.

Acknowledged signed and sealed in presence of

James Nourse,
Michael Rench,
her
Susannah X McCown.
mark

On the 10th of July following the will was proved by the executors and ordered to be recorded.

Statements have frequently appeared in various publications regarding the manner of Fitch's death, and the disposal of his body. The Bardstown (Kentucky) *Gazette,* of August 13, 1842, edited by J. D. Nourse, Esq., (named as co-executor in Fitch's will) says:

''He (Fitch) died in this village at the house (tavern) of Alexander McCown, and was buried by his landlord in the town graveyard. Mr. McCown is dead, and there is no one living here now who can point out the exact spot where Fitch was buried. Judge Rowan was the intimate friend, and one of the executors of Fitch. He (Fitch) resided here two years preparing a model of his great invention.. Before he had completed it his health was broken by a disorder of the stomach, and his mind, so long and so intently fixed upon a single subject, was probably considerably impaired. The evening before his death he requested his attendant, Mr. Cokendolfer, who is now dead, to hand him a box of pills which lay on the table in his room. He dissolved his pills in a glass of wine and drank it off. His landlady, Mrs. McCown, asked him why he had taken so many. He replied, ''I have taken them to help me home to my God.'' He died the next morning.

John Rowan, one of the executors named by Fitch in his will, in a letter to Chas. Whittlesey, Esq., dated Dec. 26, 1842, says: ''I knew John Fitch, at Bardstown, well. He was a tall man of good personal appearance; of high, mathematical talents, and this was the peculiarity of his mind. He was not, in general, social; but to persons of intelligence, who could comprehend his views, he was an interesting companion. The steamboat project occupied his mind continually, and he has often foretold to me the great advantage it would be to the Western world, which, he said, ''would become the centre of the Union, and the Atlantic States. Fitch was a man of strict veracity; whatever he advanced was under a full and honest conviction. He was remarkable for this, and never asserted as true what he did not firmly believe to be so. I was convinced from his statements and explanations, and papers, that he was the real inventor of steamboats. A large bundle of papers relating to this matter was left with me, and last summer they were all burnt in my house at Bardstown. Mr. Fitch had two models of his boat, one with paddles or oars, and the other with a wheel.''

CHAPTER II

JAMES RUMSEY'S CLAIM TO THE DISCOVERY OF STEAMBOAT NAVIGATION

James Rumsey, of Maryland, with no knowledge of the fact that other inventors were experimenting along the same lines which engaged his attention, disputed the claims of Fitch to originality as the inventor of a boat propelled by steam. He was a native of Cecil County, Maryland, but removed in his early years to Shepardstown, Virginia, where he engaged in mechanical labors. As early as July or August, 1783, his attention was directed to the subject of steam navigation, and under the most disadvantageous circumstances succeeded, in the autumn of 1784 in making a private, but very important experiment in order to test some of the principles of his invention. He felt so confident of ultimate success, that at the October session of the Virginia Legislature for that year, he applied for and obtained an act, guaranteeing to him the exclusive use of his invention in navigating the waters of that State. About the same time he communicated with, and gave a partial description of his invention to General Washington. He exhibited a crude model to a company of visitors at Berkeley Springs in the year 1784. Washington was among those who witnessed the first experiment. So fearful was Rumsey that others might obtain a knowledge of his discovery that he enjoined all to secrecy. He obtained from Washington a certificate of which the following is a copy:

"I have seen the model of Mr. Rumsey's boat, constructed to work against the stream; examined the powers upon which he acts; have been an eye-witness to an actual experiment in running waters of some rapidity, and give it as my opinion (although I had little faith in it before) that he has discovered the art of working boats by mechanism and small manual assistance, against rapid currents; that the discovery is of vast importance; may be of the greatest usefulness in our inland navigation; and if it succeeds, of which I have no doubt, the value of it is greatly enhanced by the simplicity of the work, which, when explained, may be executed by the most common mechanic.

"Given under my hand and seal, in the town of Bath, county of Berkeley, in the State of Virginia, this 7th day of September, 1784.

George Washington."

It will be noted that the word "*steam*" is not once mentioned in this certificate, but refers to "the art of working boats by mechanism and small manual assistance". In January, 1785, Rumsey obtained a patent from the General Assembly of Maryland for navigating the waters of that State. Through the whole of that year Rumsey was engaged in constructing a boat, and procuring, improving, adopting and testing the several parts of his machinery. He finally completed his boat, and made a public exhibition of it in 1786. [It will be remembered that Fitch made his first public exhibition of his boat on July 20, 1786]. In this trial Rumsey succeeded in propelling his boat against the current of the Potomac, near Shepardstown, at the rate of four or five miles an hour.

Rumsey's boat was about fifty feet in length, and was propelled by a pump worked by a steam engine, which forced a quantity of water up through the keel; the valve was then shut by the return of the stroke, which at the same time forced the water through a channel or pipe, a few inches square (lying above or parallel to the kelson) out at the stern under the rudder, which had a less depth than usual, to permit the exit of the water. The impetus of this water, forced through the square channel against the exterior water, acted as an impelling power upon the vessel. The reaction of the affluent water propelled her at the rate above mentioned when loaded with three tons in addition to the weight of her engine of about a third of a ton. The boiler was quite a curiosity, holding no more than five gallons of water, and requiring only a pint at a time. The whole machinery did not occupy a space greater than that required for four barrels of flour. The fuel consumed was not more than four to six barrels of coal in twelve hours. Rumsey's other object was to apply the power of a steam engine to long poles which were to reach the bottom of the river, and by that means to push a boat against a rapid current.

After this last experiment Rumsey was under the strong conviction that skilful workmen and perfect machinery were alone wanting to insure success, and as these could not be procured in his own country he resolved to go to England. With slender means of his own, and with a little aid from others he then resumed, with untiring energy his great undertaking. He proceeded to procure patents of the British government for steam navigation; these patents bear date in the beginning of 1788, and include among other claims the cylindrical boiler.

Difficulties and embarrassments of a pecuniary nature, and such as invariably obstruct the progress of a new invention attended him in England. He was compelled to abandon temporarily his main object, and turn his attention to something else in order to raise means to resume it. He undertook with the same power but by its more judicious application, to produce higher results in several water works, in all of which he succeeded, achieving thereby some reputation, as well as obtaining funds to apply to his favorite project. He was finally compelled however, in order to avoid arrest and imprisonment for debt, to transfer at what he considered a ruinous sacrifice, a large interest in his inventions—a contract which entangled and embarrassed him through life. Still, however, he struggled on, undismayed, and had constructed a boat of about one hundred tons burden, and pushed forward his machinery so near to the point of completion as to be able to indicate a day for a public exhibition, when his sudden death occurred from apoplexy, while discussing the principles of one of his inventions before a philosophical society of London. With his death the whole project ceased—there was no one present to administer—no one present able to carry it out. All that he left--his boat and machinery—barely sufficed to satisfy his creditors.

In the controversy that existed between Rumsey and Fitch regarding the originality of their respective inventions, a decision was obtained in favor of the latter, but both are entitled to the gratitude and admiration of the world for their earnest and persevering efforts to solve the great problem of steam navigation.

The following resolution introduced in the Kentucky House of Representatives Feb. 9, 1839, was unanimously adopted:

"Resolved by the Senate and House of Representatives, etc., That the President be and hereby is requested to present to James Rumsey, deceased, a suitable gold medal, commemorative of his father's services and high agency in giving to the world the benefits of the steamboat."

The "Virginia Gazette," dated Winchester, December 16, 1787, stated that: "On the 11th of this month Mr. Rumsey's steamboat, with more than half her loading (which was about three tons), and a number of people on board made a progress of four miles an hour against the current of the Potomac River, without any external application whatsoever, impelled by a machine that will not cost more than twenty guineas for a twelve ton boat, and that will not consume more than four bushels of coal, or the equivalent of wood, in twelve hours. It is thought that if some pipes of the machine had not been ruptured by the freezing of water which had been left in them a night or two before, and which ruptures were only secured by rags tied around them, that the boat's way would have been at the rate of seven or eight miles an hour. As this invention is equally applicable to boats or ships of all dimensions, to smooth, shallow and rapid rivers, in the deepest and mightiest seas, freightage of all kinds will be reduced to one-third of its present purpose.''

The following letter from Col. John Stevens, of Hoboken, to James Rumsey shows not only the progress which he himself had made in the development of steam navigation, but shows also the unselfish interest he took in the experiments of others and the desire to assist them regardless of his individual interests.

''Sir,

Hoboken, Bergen County, Sept. 5th. 1788

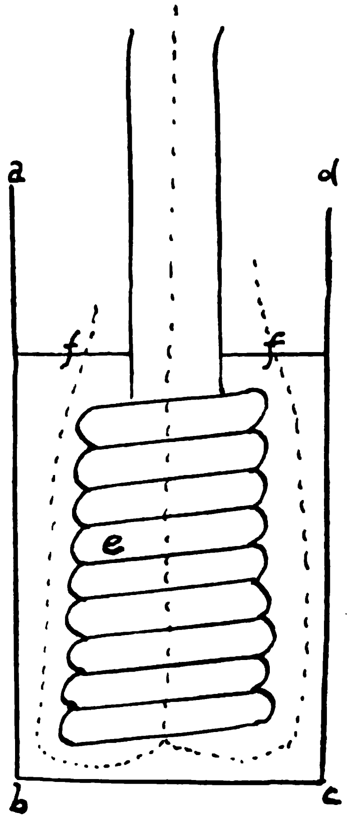
I shall not trouble you with any apology for thus addressing you, although to you a stranger. If the following hints prove of any service towards perfecting your projects, you are heartily welcome to them. Though they may not suggest to you anything new, yet as the writer thereby manifests his good wishes towards the promotion of useful discoveries, you cannot but be pleased with them.

I have not been able to procure any other information respecting your plan of propelling a Boat by means of Steam, than what I could collect from your pamphlet published at Philadelphia, and from another published at the same place entitled: ''Remarks on Mr. John Fitche's'' etc.

Your invention of generating steam by means of a worm, is certainly of the utmost importance, but more particularly so when applied to the purposes of navigation. An insuperable objection to the application of steam in any mode hitherto made use of, is the very great proportion of room which the boiler & other apparatus must necessarily occupy on board a vessel.

Since reading your pamphlet, I have occasionally turned in my mind how steam might be generated in the most expeditious manner, and at the same time reduce the volume of the apparatus to the smallest compass possible. The following is the result of what has occupied me on this subject.

P. Q. suppose a b c d to be a circular stove of sheet or cast iron. The figure e within the same will represent the convolutions of a worm made of copper, or other metal; these convolutions must lie close one on another, so as to prevent air and smoke from passing between them.



From the top of the worm a funnel or flue must be carried to the hight of a foot or eighteen inches above the top of the stove. The fuel must be placed in the upper part of the stove on each side of the flue. As soon as the flue becomes sufficiently heated, the current of the flame and smoke will follow the course represented by the dotted lines in the figure, that is, after passing down between the sides of the stove & the outer sides of the worm to the bottom, and then risng up again in the circular space contained within the convolution of the worm, the smoke will finally issue out at the top of the flue. The smoke thus descending through the live coals, resting on the grating at F F, is converted wholly to flame, and acquires a degree of heat much more intense, than when it passes immediately upwards in the usual way. Within the worm aforesaid should be another worm extending the whole length thereof; the interior worm should be filled with water (the water to be supplied by a reservoir placed above the stove & over the flue) and should be perforated in different parts of its circumference with small punctures or holes, so as to distribute the water equally against the side, or inner circumference of the outer worm.

It is obvious that a machine thus constructed would occupy very little space, would be very light, and would generate an immense quantity of steam.

With very little additional machinery the piston, which is raised by means of the steam, and depressed again by the pressure of the atmosphere, might be made to force water through two trunks alternately, through one at the rising, and through the other at the falling of the piston, by which the force of the engine would be doubled.

I do not apprehend in what manner you apply the phenomena attending falling bodies to the operation of the piston—indeed if I were to raise an objection to your scheme, it would to the practicability of giving any *great* degree of velocity to a vessel by means of *your* mode of applying the force of steam. It is obvious that the velocity of the vessel cannot exceed the velocity given by each stroke of the piston to the water contained in the trunk. It must, however, be admitted that the velocity of the water in the trunk, by contracting its diameter, may be increased ad libitum.

By a very simple contrivance, I think, the piston might be made to give motion to a system of common oars, the number of which might be multiplied, and adapted to the force of the engine & the size of the vessel; and by lengthening the blades and shortening the handles, a velocity of perhaps 15 or 20 miles per hour might be acquired.

I am, Sir,
Your obdt. Servant
John Stevens, Junior.

CHAPTER III

CLAIMS OF NATHAN READ, NICHOLAS ROOSEVELT, CAPT. SAMUEL MOREY AND ELIJAH ORMSBEE

NATHAN READ, a native of Warren, Maine, born July 2, 1759, while not claiming originality in the application of steam to navigation, made considerable progress along the lines where others had been only partially successful. He was a man of education, a graduate of Harvard College. He began his experiments in 1788 after learning of the experiments of Rumsey and Fitch, and became convinced after a thorough investigation of their methods that he could improve on them. Like Fitch and Evans, he believed that steam power could be applied to carriages as well as boats by the use of lighter and more compact machinery. He invented as a substitute for the working (or walking) beam, the cross head running guides with a connecting rod to communicate the motion, similar to that adopted later by Robert Fulton in his "Car of Neptune." This "new invented cylinder," as he called it, to which this working frame was attached, was a double acting cylinder. To render the boiler more portable Read invented the multitubular form, which was patented with the cylinder, chain-wheel, and other appliances. In his United States patent obtained in 1791, for this boiler and for the improvement of the steam cylinders, he described "a practical mode of driving or impelling boats or vessels of any kind in the water or against the current by means of the chain-wheel, a rowing machine constructed and operated upon the general principles of the chain-pump, and moved by the force of steam or any other power, in the same manner as the chain pump is moved."

In this claim he uses the qualifying phrase of "steam or any other power. In 1789 he constructed a boat to which he attached paddle wheels to an axis extending across the gun wales of the boat, turned by a crank, and designed to be moved by his high-pressure engine with the continuous rotation principle of Watt. By means of this crank worked by hand, Read propelled himself with great rapidity across an arm of the sea, called Porter's River, in Delaware. Satisfied from his experiment that paddle-wheels would drive a boat with great ease and speed when turned by the power of a steam engine, and controlled by its steady rotative principle, he determined to use paddle-wheels, and constructed a model of his steamboat accordingly, intending to take out a patent. On February 8, 1790, he made application to Congress for a patent for his inventions, specifying that he had "discovered an improved method of applying the power of steam to the purposes of navigation," and the machinery for communicating motion to boats, vessels, etc., is very simple, and takes up but little room. Up to this time no patent laws had been established, but shortly after this, through the efforts of John Stevens, of Hoboken, N. J., an "Act to promote the progress of the useful arts," was passed, constituting the Secretary of State and Secretary of War, and the Attorney General, a Board of Commissioners to whom all matters of this character were to be referred; and Read's application came before the new Board. He first asked for a patent for a boat consisting of paddle-wheels, his newly invented boiler, and improved cylinder, but in looking over the early issues of "The Transactions of the Royal Society," he discovered that some time previous, both paddle-wheels and oars had been used in France to move a war ship when becalmed. Believing that this simple experiment would probably interfere with his right to a patent for a boat with paddle-wheels, he withdrew so much of his claim as related to them, and on January 1, 1791, presented an amended petition, substituting a new propelling agent which he called "a rowing machine," to revolve like a chain pump, which appeared to him as the best substitute for the paddle-wheels which he had discarded, but which he still considered preferable. It will be remembered that John Fitch, some time previous to this had tried the paddle-wheels and discarded them for oars. In a letter to Hon. Timothy Pickering, dated January 27, 1817, he says:

"On the same sheet of paper is a drawing, and in the same manuscript a description of a steamboat constructed with paddle-wheels in the same manner they are now used This drawing of the boat was taken about the same time from one which I built and rowed myself across Porter's river in Danver's, in the year 1789, in presence of Dr. Prince of Salem. I have good reason to believe that this was the first boat ever constructed with paddle-wheels with an avowed intention of propelling it by steam.

"On the 8th of February, 1790, about two months before the passing of the act to Promote the Progress of the Useful Arts, I presented a petition to Congress for a patent for the above, and other inventions. . . . Some months after presenting this petition, I unluckily discovered by looking into some of the first volumes of the Philosophical Transactions, that an experiment had been made on board a French frigate, with a view to ascertain the comparative utility of wheels and oars in a calm

Unacquainted with the spirit of the law, and not knowing that a new application was deemed a new invention, I took out a patent on a new petition for a steamboat in the year 1791, to be propelled through the water by chain-wheels—scrupulously avoiding the simple wheel which answered my purpose very well—supposing I should not be entitled to a patent for it in consequence of it having been applied in another way on board a frigate."

In another letter, dated August 22, 1834, he says: "I spent considerable part of the winter of 1790 in the city of New York, and exhibited drawings and descriptions of my steamboat, steam carriage, etc., to President Washington, to whom I had letters of introduction to General Lincoln. I also showed them to some members of Congress. I presume to upwards of fifty other gentlemen, (some of them distinguished mechanics) in the city of New York, and explained to them the principles of the machinery and of the boiler designed for steamboats and land carriages.

"I boarded at Mrs. Wheaton's in company with Dr. Cutler and Gen. Rufus Putnam, and I recollect perfectly well they introduced General [Col.] Stevens to me, and I explained to him the principles on which my boat, boilers, etc., were constructed.

"I was too early in my steam projects. The country was then too poor, and I have derived neither honor nor profit for the time and money expended.

"I was, however, still more gratified last spring in viewing a locomotive engine capable of moving a mile in two minutes, put in operation by steam generated in a portable boiler, constructed substantially on the same principle with the one which I invented for that and other purposes about *forty-six years ago,* and for which I obtained a patent the first day that any patent was ever issued by authority of the United States.

"I have a distinct recollection when my petition to Congress was read in Congress Hall by the Clerk of the House of Representatives, that when he came to the part which related to the application of steam to land carriages, a general smile was excited among the members, and this idea was considered there and in Salem, where I had a model of a steam carriage constructed, as perfectly visionary.

THE FIRST PATENT ISSUED BY THE UNITED STATES GOVERNMENT UNDER THE NEW ACT

THE UNITED STATES

To all to whom these presents shall come

GREETING

Whereas, Nathan Read, of Salem, in the State of Massachusetts, hath presented a petition to the Secretary of State, the Secretary of the Department of War, and the Attorney General of the United States, alleging and suggesting that he hath discovered the following useful devices, not before known, neither used: that is to say, an improvement of the boiler of the steam engine, by constructing it in such a manner as to constitute of itself a complete furnace that more effectually prevents the loss of heat than any other furnace that is wholly or in part foreign to the boiler itself, by reducing its size and rendering it very portable, and at the same time increasing its force by exposing within a small space a very large surface directly to the fire, and by connecting it with a reservoir in such a way as to be replenished with water with as much safety and conveniency when on board a vessel in motion as at rest. Also an improvement of the steam cylinder by which it is rendered more portable and convenient for working in an inclined or horizontal position, and which has two stems or rods, one coming out at each end of the cylinder, and alternately acting with equal force and in contrary directions. And also a practical mode of driving or impelling boats or vessels of any kind in the water, or against the current by means of the chain-wheel, or rowing machine constructed and operating upon the general principles of chain-pump, and moved by the force of steam or any other power in the same manner the chain-pump is moved; and praying that a patent may be granted therefore. And, whereas, the said discovery hath been deemed sufficiently useful and important. These are, therefore, in pursuance of the Act entitled 'An Act to promote the Progress of the Useful Arts,' to grant to the said Nathan Read, his heirs, administrators or assigns for the time of fourteen years, the sole and exclusixe right of making, using and vending to others to be used, the said discovery, so far as he, the said Nathan Read was the discoverer, according to the allegations and suggestions of the said petition.

"In testimony whereof I have caused letters to be made Patent, and the Seal of the United States to be hereunto affixed.

"Given under my hand at the City of Philadelphia the twenty-sixth day of August, one thousand seven hundred and ninety-one, and the Independence of the United States of America the sixteenth."

George Washington.

[L. S.] By the President.

Thomas Jefferson.

City of Philadelphia, August 28, 1791.

NICHOLAS ROOSEVELT, a native of New York City, and a descendant of the old Roosevelt family to which ex-President Roosevelt belongs, claimed to be the inventor of the vertical wheel adopted by Robert Fulton in his first steamboat. John B. Latrobe, in his "Lost Chapter in the History of the Steamboat," states that "Roosevelt returned to New York from Esopus, where he then resided, and where he made a small wooden boat across which was an axis projecting over the sides with paddles at the ends, made to revolve by a tight cord wound around to middle by the action of hickory and whalebone springs. In December, 1797, Chancellor Livingston wrote to Roosevelt, saying, 'Mr. Stevens has mentioned to me your desire to apply the steam engine to a boat; every attempt of this kind having failed I have constructed a boat on perfectly new principles, which both in model and on a large scale has exceeded my expectation. I was about writing to England for a steam machine, but hearing of your wish I was willing to treat with you as honest, which I believe you will find advantageous for the use of my invention."

In 1800 Roosevelt launched a little steamboat on the Passaic river, and made a trial trip with a party of invited guests. In 1815, in a petition to the New Jersey Legislature, that "he is the true and original inventor of steamboats with vertical wheels, he says:

"In or about the year 1781 or 1782 he resided with Joseph Vostenaudt, about four miles above Esopus on the North River, in New York, and that he did there make, rig, and put in operation a small wooden model of a boat, with vertical wheels over the sides, each wheel having four arms or paddles made of shingles; and that those wheels being acted on by hickory or whalebone springs, propelled the model boat through the water by the agency of a tight cord passed between the wheels, and being reacted upon by the springs."

Roosevelt had fully described to Mr. Livingston a vertical wheel which he earnestly recommended. This is said to be the first practical suggestion of the combination that made steam navigation a commercial success, although four years later Robert Fulton believed that chains and floats were alone to be relied upon. Livingston, however, had replied to Roosevelt's proposition on Oct. 28, 1798, that "vertical wheels are out of the question." But in the spring of 1802, Livingston having communicated Roosevelt's plan to Fulton they adopted the former's view, and in January of the next year, launched a boat that was propelled by Roosevelt's vertical wheels. Roosevelt, in the meantime, had become greatly embarrassed financially, and he was unable to put his plans into operation. In 1809 he associated himself with Fulton in the introduction of steamboats in the western waters, and in 1811 he built and navigated the New Orleans, the first boat that descended the Ohio and Mississippi rivers from Pittsburg to New Orleans in fourteen days, having previously descended both rivers in a flatboat to obtain information. In January, 1815, he applied to the Legislature of New Jersey for protection as the inventor of the vertical wheels for which he had obtained letters patent for the United States in December, 1814 The Legislature, however, declined to interfere in the matter. In 1816 he laid claim to the invention of the vertical wheels for steamboats as appears by the following advertisement:

"STEAMBOAT NOTICE. All persons are hereby informed that I claim the right of Inventor of Vertical Wheels, as now generally used for Steam Boats throughout the United States, having been first used after my invention in the North River Steamboat by Messrs. Livingston & Fulton.

"I have obtained a patent in due form of law, for my invention, which is dated the 1st day of December, 1814.

"No other person in the United States has any *Patent* but myself, for the invention of Vertical Wheels. Having obtained a legal title to the sole use of steam boats with such wheels I hereby forewarn all persons from using them hereafter without license from me. The patent and evidence of my right are in the hands of William Griffith Esq., of the City of Burlington my Counsellor-at-law.

"On this subject so very important to me, (being the only real and efficient invention since Fitch's boat), I do not by this notice challenge controversy, but am prepared to meet it in any form. My object is to make known that I am the inventor and have the *Patent* right. Individuals, or companies who use such wheels without my license after this will be prosecuted under the Law of Congress for damages amounting to the profits of the boat. Licenses will be sold by me at moderate rates, and warranted.

"Nicholas J. Roosevelt.

Burlington, N. J. 4th March 1816."

"Note. Although my Patent assures me a legal right, any person may be further satisfied of my just claim by recurrence to the evidence in the hands of my Counsel-at-Law. They consist principally of *original* letters between Chancellor Livingston, Mr. Stevens and myself, on this very thing at the time of my invention, accompanied with depositions of many persons witnesses of and knowing to the fact."

N. J. R.

March 15, 1816.

Capt. Samuel Morey, a native of Hebron, Conn., (born Oct. 23, 1762), afterwards a resident of Oxford, New Hampshire, was another inventor who aimed to solve the problem of steam navigation. He began his experiments as early as 1790. He built a boat, which he equipped with a steam engine devised by himself, and with a companion navigated the Connecticut river in the vicinity of Oxford at a speed of four miles an hour. The boat was propelled by a paddlewheel in the prow. After experimenting for a time near his home he went to New York, built a boat, and spent three summers there in his efforts to demonstrate the practicability of his methods. Being compelled, on account of sickness to return home he had his boat taken to Hartford, Conn., where he ran it in the presence of many persons. The next season, having made improvements in the engine he returned to New York and applied the power to a wheel in the stern, and succeeded in propelling the boat at a speed of about five miles an hour. With this steamboat he made a trial trip from the ferry to Greenwich and back, accompanied by Chancellor Livingston and others who expressed themselves as highly gratified at his success. Morey accepted an invitation to visit the Chancellor at his home in Clermont. He continued his experiments another summer encouraged by the Chancellor's promises that if he succeeded in running his boat eight miles an hour he would give him a large sum, which is said to have been $100,000. For what he had already accomplished Livingston offered him $7,000 for a patent to cover certain territory, but Morey declined the offer. On March 25, 1795, a patent was issued to Samuel Morey for a steam engine, the power to be applied by crank motion to propel boats of any size. The patent office records show that on March 27, 1799: November 17, 1800, patents were issued to Morey for the application of steam, and another in 1803, for a steam engine. Morey continued his efforts in this direction, and in June, 1797, built another boat at Bordentown, New Jersey.

In a letter addressed to William A. Duer, Esq., Oct. 31, 1818, Morey says: "As near as I can recollect it was as early as 1790 that I turned my attention to improving the steam engine and applying it to the purpose of propelling boats. . . . In June, 1797, I went to Bordentown, on the Delaware, and there constructed a steamboat, and devised a plan of propelling by means of wheels, one on each side. The shafts ran across the boat with a crank in the middle worked from the beam of the engine with a shackle bar. . . . The boat was openly exhibited in Philadelphia. . . . I took out patents for my improvements. . . . I never had any doubt that I had a right to take out a patent for the application of two wheels to a steamboat, and often told Mr. Livingston and Mr. Fulton that I had. To the latter I once asserted this right when on board his steamboat with him.

Rev. Cyrus Mann, of Oxford, New Hampshire, in an account of the "first practical steamboat" said: "The astonishing sight of this man [Morey] ascending the Connecticut River between Oxford and Fairlee in a little boat just large enough to contain himself and the rude machinery connected with the steam boiler, and a handful of wood for a fire, was witnessed by the writer in his boyhood. This was so early as 1793 or earlier."

ELIJAH ORMSBEE, a native of Connecticut but a resident of Rhode Island, hearing no doubt of the experience of Fitch and others and of the difficulties encountered by them in steam navigation, began in a small way, in 1794 to solve the problem. He had witnessed the use of steam as a motive power in pumping water from mines and believed he could apply it to the navigation of boats. He consulted with one David Wilkinson, of Pawtucket, a man of considerable inventive genius who became much impressed with the idea and agreed to assist him. He cast and bored a cylinder, and made the necessary wrought iron connections. Two kinds of paddles were proposed; one called a flutter-wheel (a side-wheel); the other turned a goose-foot, which they decided to try, as the power could be applied more cheaply. Ormsby obtained from Messrs. Clark & Nightengale the loan of a long boat belonging to the ship "Abigail," for the experiment; and also borrowed from Captain Ephraim Brown a copper still of about one hundred and fifty gallons capacity, and began his operations at a place called Windsor Cave, where all of the wood and much of the iron work was done by himself. At last, one pleasant afternoon or evening, in the autumn of 1792, he got into his boat, pulled the throttle valve, and the boat glided out into the bay. He was yet fearful that his new found power might fail him, and sat silent and eager, watching the piston rise and fall, and the paddles go to and fro. But it did not fail; the boat glided steadily through the water and arrived at Long Wharf, in Providence. The next day Mr. Ormsby started in his boat for Pawtucket, to show Mr. Wilkinson the success which had attended his enterprise. After a day or two the boat came back to Providence, where it was received with great astonishment. For several weeks the boat ran up and down the river to the delight of his townsmen and friends.

The steam was not applied to elevate and depress the piston as was done by Watt, but applied to raise the piston, and then being condensed by cold water; the piston was turned by atmospheric pressure. In this way the goose-foot paddles of the boat were moved forward and backwards. When they moved forward they closed, and when they moved backward they expanded to a width of from eighteen to twenty-four inches. The speed of the boat was from three to four miles an hour, which would probably have been increased to five or six miles if wheels had been substituted for paddles. "But," says one writer, "Ormsby had no Livingston with open purse to assist him, and so, after having demonstrated the possibility of steam navigation his golden dreams faded, and he sorrowfully returned the still to the distillery and the boat to its owner."

It was said by Mr. Wilkinson, who took the works after the boat was abandoned, that he exhibited and explained them to Daniel French of Middletown, Conn., an early inventor who was one of the first to go West to demonstrate his ideas. French built the "Enterprise" during the War of 1812-15 to run on the Mississippi. The writer has seen a letter written to a friend in Middletown, Conn., in 1816 in which he says: "I shall never return home *until I return on a steam carriage of my own."*

CHAPTER IV

INVENTIONS OF COL. JOHN STEVENS AND ROBERT L. STEVENS IN STEAM NAVIGATION

The world is indebted to these two men for some of the greatest improvements ever made in steam navigation. Men of high scientific attainments and inventive genius, they were in no way handicapped in their experiments as Fitch and other inventors had been. They had the equipment for experimenting, and abundant means for carrying forward their enterprises both on land and water. In some of their inventions they are entitled to full credit for originality with none to dispute their claims. They attained a world-wide reputation and contributed materially to the commercial prosperity of their native State, and of the country generally.

Col. John Stevens was a native of New York city, and connected socially and by marriage with some of the leading families of New York and New Jersey.

Hon. Abram S. Hewitt, at a public banquet held Feb. 18, 1897, after referring in glowing terms to the great work accomplished by the Stevens family, said in conclusion:

"But I am asked to speak especially of the Founder. I have been speaking of the founder, John Stevens, the elder, John C. Stevens, Robert L. Stevens and Edwin A. Stevens, who were the founders and pioneers who have made the country what it is—the miracle of the ages, the admiration of the world. No one who cannot go back, as I can to the time when there were no railways, to the time when there were no ocean steamers, when there were no telegraphs, no telephones, no armored navies, no access to any point beyond the Mohawk Valley, when the great West was yet unsettled; when this great empire was a wilderness—no one who cannot recall this primitive condition of things, and did not see it, can realize what the Stevens family has done for America."

Col. John Stevens, son of John Stevens the American ancestor of this branch of the Stevens family, was born in New York city in 1749; he was graduated at Kings, now Columbia College. in 1768; studied law and was admitted to the bar in 1771. During the Revolutionary War he held several offices, among which

COL. JOHN STEVENS
Steamboat Inventor and Promoter

was that of treasurer of the State. His winter residence was on Broadway, New York, and his summer residence at Hoboken, N. J., where he owned a large property, and subsequently made that his permanent residence. He seems to have had a greater taste for mechanical experiments than for his profession, and was moreover quite an inventive genius. He was possessed of ample means to gratify his tastes in this direction and very soon after the close of the War of the Revolution he began his experiments in steam navigation and, judging from his own statement he brought his experiments to a successful termination at a much earlier date than any of his competitors in this line. He made application to the State Legislature in 1789 for the exclusive privilege of navigating the waters of the State of New York by steamboats.

To the Honorable the Legislature of the State of New York in
Senate & Assembly convened

The Petition of John Stevens Junr of Hoboken in the State of New Jersey

That your Petitioner has bestowed a great deal of Time and Thought toward perfecting a Machine for propelling a Vessel through the Water by means of Steam That he has at length brought his Invention to that degree of perfection That as he conceives, little or no further Improvement can be made on it —That to the best his Knowledge and Belief., his Scheme is altogether new, or at least does not interfere with the Inventions of either of the Gentlemen who have applied to your honorable Body for an exclusive Right of navigating by means of Steam

That your Petitioner has made an exact Draught of the different Parts of his machine with an Explanation Thereof, he is ready to exhibit provided that after the Exhibition Theory no one be suffered to lay claim to any Invention therein described, unless he shall have before exhibited a draught or model Thereof to your honorable Body—and your Petitioner therefore prays. That in case his machine should appear to be a new and useful Invention, That the Honorable, the Legislature would be pleased to grant to him an exclusive privilege and Right of using the same for the purpose of navigation throughout the State of New York for such term of Years as shall seem meet

And your Petitioner
shall ever pray

John Stevens Junr

presented 9 January 1789

The Proceedings of the New York Legislature show that on
Friday January 9 1789

"A petition of John Stevens Jan. Hocbuck in New Jersey, praying for an exclusive privilege to build steamboats on a plan lately by him invented" was read and referred to the same committee as the petition of James Rumsey.

This shows that James Rumsey's petition had preceded that of Col. Stevens's, and Stevens alludes incidentally to that fact when he says that "to the best of his knowledge and belief his scheme is altogether new, and does not interfere with the inventions of other gentlemen who have applied to your honorable body for an exclusive right of navigating by means of steam." A careful examination of the Proceedings of the Senate and Assembly for some months following, shows that no further action was ever taken in regard to this petition, the reasons for which will appear hereafter. Rumsey's Petition was taken up by the Assembly, Feb. 16, 1789, viz:

"The bill, entitled 'An act securing to James Rumsey the sole right and advantage of making and employing for a limited time the several inventions and implements by him lately moulded, was read a second time, and committed to a committee of the whole house."

Tuesday, Feb. 20.

Reports from the committee to whom was referred the bills for securing to James Rumsey the right and sole advantage of making and employing for a limited time the several inventions and improvements by him lately invented—that amendments had been made in the title of the said bills which were concurred in, and ordered to be amended accordingly. The records of the Senate show that final action was taken five days later.

New York Senate, Feb. 25, 1789.

"Mr. Douw, from the committee of the whole to whom was referred the bill entitled, *'An act securing to James Rumsey the sole right and advantage of making and employing for a limited time the several mechanical improvements by him lately invented;'* reported that the committee had gone through the bill, without amendment, and agreed to the same, which report he read in his place, and delivered the bill at the table. Thereupon,

Resolved, That the bill do pass.

Ordered, That Mr. Duane and Mr. Humphrey deliver the bill to the Honorable the Assembly and inform them that the Senate have passed the bill without amendment."

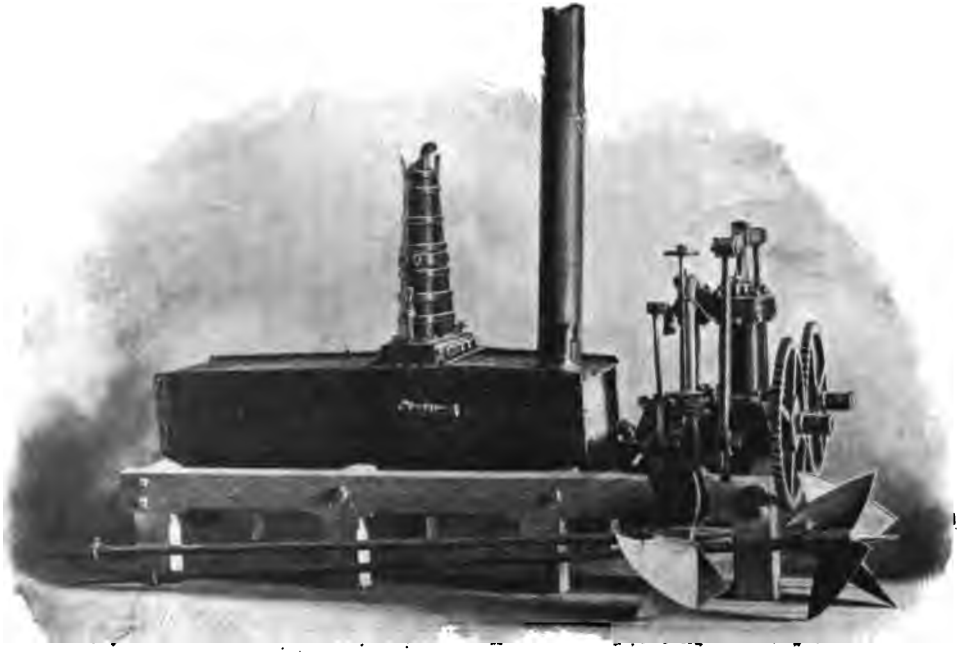
Action was taken on Rumsey's bill as a matter of precedence, his petition having been filed a few days earlier than that of Col. Stevens's. It is not probable that the merits of the two bills received any consideration whatever as the subject was entirely new to that body and Col. Stevens was not a man who would ever attempt to exert political influence, or to use any means whatever that his conscience did not approve. He therefore ceased his activities in this direction until such time as he could obtain legal protection against infringement of his invention.

In May, 1804, he constructed a steamboat which went from Hoboken to New York and returned; its propelling power being a wheel at the stern, formed in the manner of a windmill or smoke-jack, and driven by a rotary engine. This engine not proving successful, it was superceded by one of Watt's engines, when the vessel attained an average speed of four miles an hour. For a short distance he maintained a speed of seven or eight miles an hour, but could not continue this for any length of time, owing to a deficiency of steam.

"That this was a helix," says one writer, "his letter of 1804 to Dr. Robert Hare of Philadelphia shows." This is said to have been the *first application* of steam to the screw propeller. The engine and boiler of the steamboat are preserved in the Stevens Institute of Hoboken. Professor Renwick states that the machinery was made under Stevens's own direction, and in his own shop at Hoboken. It set in motion two propellers (the first double screw) of five feet in diameter, each furnished with four blades, having the proper twist—to obtain which he had great difficulty with his workmen,—and at an angle of thirty-five degrees.

It is somewhat remarkable that after 1804, no serious attempt was made for the practical introduction of the screws until 1837, when it was brought into use simultaneously in England and the United States. Still more remarkable is the fact that the introduction into use in England, was the Archemides screw of a single thread, and in America by a metallic threaded screw on the outer surface of a cylinder; that the first was completely modified in the course of five or six years into the short four thread screw that was used by Stevens in 1804.

Col. John Stevens, in 1806, assisted by his son, Robert L. Stevens, built the paddle-wheel steamboat "Phoenix" that plied for six years on the Delaware river. Prof. James Renwick, in referring to Fulton's steamer, the Clermont, as she was in the autumn of 1807, says: "The Stevenses were but a few days later in moving a boat with the required velocity, and that being shut out of the waters of New York by the monopoly of Fulton and



THE ORIGINAL JOHN STEVENS BOAT ENGINE OF 1804
Now in the National Museum, Washington, D. C.

Livingston, Stevens conceived the bold design of conveying his boat to the Delaware by sea, and this boat which was so near reaping the honor of first success, was the *first to navigate the ocean by the power of steam.*

Professor Charles King, of Columbia College, in a lecture on "The Progress of the City of New York During the Last Fifty Years" (Dec. 29, 1851) said: "For at that time (1807) steam engines, as applied to the various processes of manufacturing or other industry on land, were little known generally, and the whole United States furnished, it is believed, but one machine shop or foundry where a steam engine could be made, and that was opposite to this city at Hoboken, in the works of Col. John Stevens.

"The palm thus gained by Fulton was closely contested by John Stevens, of Hoboken, who, long in concert with Robert R. Livingston, had made experiments in steam as a means of propulsion, but now, aided by the genius and practical mechanical skill of his son, Robert L. Stevens, was operating separately. Almost simultaneously, but yet behind by that fatal quarter of an hour which determined the fate of so many enterprises, and of so many human beings, both men and women, Mr. Stevens produced, independently of Fulton's plans and improvements his steamboat 'Phoenix;' but, prescribed by the monopoly which Fulton's success had obtained for him of the waters of New York. Mr. Stevens first employed her as a passage boat between this city and New Brunswick, and finally conceived the bold purpose of sending her round to Philadelphia by sea, and he executed it successfully. His son, Robert L. Stevens, went around with the boat in the month of June, 1808. A fierce storm overtook them. A schooner, in company was driven out to sea, and was absent many days; but the 'Phoenix' made a safe harbor at Barnegat, whence, when the storm abated, she proceeded safely to Philadelphia, and plied many years between that city and Trenton."

The piston rod of the "Phoenix" was guided by slides instead of the parallel motion of Watts, and the cylinder rested on the condenser. Stevens also surrounded the water wheel by a guard-beam.

Among the patents taken out by Colonel John Stevens, was one in 1791, for generating steam; two in the same year described as improvements in bellows, and on Thomas Savory's engine both designed for pumping; the multi-tubular boiler in 1803, which was patented in England in 1805, in the name of his eldest son, John C.; one in 1816 for using slides.

On Oct. 11, 1811, he established the first steam ferry in the

THE "PHŒNIX"
The First Sea-Going Steamship Making Barnegat Inlet, N.J., in a Storm 1809

world, with the "Juliana," which plied between New York City and Hoboken. In 1813 he invented and built a ferry boat made of two separate boats with a paddle-wheel between them; this was run by horses.

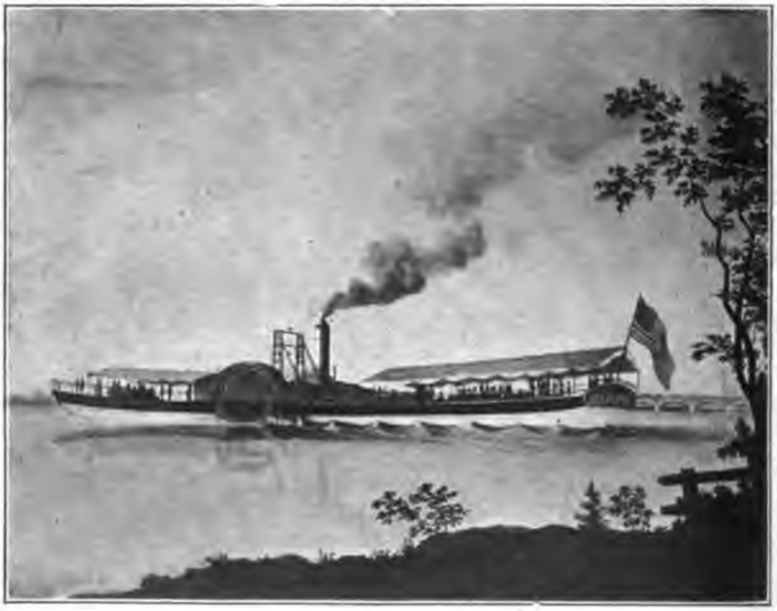
The "Stevens Indicator" for July, 1895, gave the following description of this boat:

"The steam ferry-boat 'Juliana' here referred to, was built by Col. Stevens in 1811. She was an undecked, open boat, 62 feet in length, and only 12 feet in breadth, drawing from two-and-a-half to three feet of water. The engine in her was the model patented by Col. Stevens, having a cylinder 14 inches diameter and two-and-a-half feet stroke; with copper boilers, cylindrical, with flues. The steam was used expansively, cut off in the main valves as is now done in the most approved engines. The 'Juliana' attained a speed of seven miles an hour. Mr. Fulton having an interest in the Jersey City ferry, objected to the right of Col. Stevens to run the 'Juliana' as a ferry-boat between Hoboken and New York city, as infringing his monopoly from the State of New York, and the 'Juliana' was driven off. She afterwards plied on the Connecticut River between Middletown and Hartford, being the first boat to navigate the Sound, although undecked, as Col. Stevens's boat, 'Phoenix,' was the first, in 1808 to navigate the ocean between Sandy Hook and the Delaware."

Mr. J. Elfreth Watkins, E. D., Curator of the Department of Transportation of the National Museum, Washington, D. C., said at a public gathering:

"Over a century ago, in 1792, John Stevens, of New Jersey, took out a patent in the United States to propel boats by steam. He experimented continuously until 1804, when he invented and constructed the first steamboat to navigate the waters of any country, driven by a screw. A model of this twin propeller boat, belonging to the United States National Museum is before us. The original machinery is also in Washington.

"The boat was successfully operated three years before Fulton obtained fame and fortune by putting his English engine, built by Watt, in an American hull, afterwards called the Clermont. . . . The limit, the utmost speed, which Fulton hoped or thought it possible to attain was seven miles an hour, and that he in later boats accomplished; but it was again for the name of Stevens, in the person of Robert L. Stevens, after long, and numerous experiments, cautiously conducted and tested, as to the form of vessel best calculated to overcome the resistance of the dense medium through which it was to make its way, to send forth on the Hudson—the monopoly law of the State of New York having meanwhile been overruled by the Constitution of the



THE "PHILADELPHIA," OR "OLD SAL"
Built in 1813

United States—a boat as superior in size and equipment, as in speed, to all before it, and to travel at the rate of thirteen and a half miles an hour. . . . But when the 'New Philadelphia,' R. L. Stevens's boat, in 1814, started forth at the rate of thirteen and a half miles an hour, even the senses were disturbed; philosophy, which had calculated only the resistance of the medium to the forms then usual, was at fault, and what had actually been done was pronounced impossible. But the steady, far reaching mind of the younger Stevens knew the secret of his success—that it was due to the form he had given his vessel. He saw, too, after some trips, that even that form was far from the perfection he had designed, and accordingly he went to Brown & Bell then, and even yet, I believe—eminent shipbuilders, and begged them to put on the 'New Philadelphia' a long, sharp, false bow of which he gave them the drawings. After considering the proposition they declined, declaring themselves unwilling to encounter the ridicule of what struck them as so unseemly a work, and Mr. Bell added that it would be called 'Bell's nose,' and would be the general laughing stock. Repulsed but not disconcerted, young Stevens, sure of his own conclusions, built a boat at his own shop, put it on, and obtained in consequence an additional speed of several miles an hour.

"With the 'New Philadelphia' commenced the first day line to Albany. This was the commencement of the new models, which alike in clipper steamers and clipper ships, have given to both classes of our build and navigation—our superiority over the world.

"And here let me expatiate a little upon the service to the mechanic arts, and consequently to the welfare of humanity, of the family of Stevens, resident during the half century among us. We have seen that by the lucky quarter of an hour Fulton carried away from Stevens the prize for the first successful steamboat. But years before, namely, 1804, Col. Stevens, whose fertile and ingenious mind was specially turned to mechanical inventions, had constructed and put into operation a steamboat of which the motive power was a propeller, which at this day, I believe, is admitted, in form and proportion to be the best. This boat was a small one. In it Col. Stevens put an engine with tubular boilers, the first ever made, now universal in locomotives. The machinery, made under his own direction and in his own shop at Hoboken, set in motion two propellers of five feet diameter each, and each furnished with four blades, having the proper twist—to obtain which he had the greatest difficulty with his workmen—and set at an angle of about thirty-five degrees. This vessel—used only for testing the possibility of steam navigation—so completely demonstrated the fact that Col. Stevens applied it on a large scale in 1806 to a pirogue 50 feet long, 12 feet wide, and 7 feet deep—which attained very considerable speed. Encouraged thereby, he commenced the 'Phoenix' with side-wheels to whose success allusion has already been made. It is proof of the remarkable accuracy and mechanical skill of the Hoboken workshop that the engine of the first small propeller, carefully preserved, was set up again more than seven or eight years ago, in a new vessel, and, without altering a screw, worked most successfully. The old hull and the blades of the propeller are yet in existence in Hoboken."

Robert L. Stevens, second son of Col. John Stevens, probably made more improvements in steamboat construction than any one who ever engaged in the enterprise Inheriting all those qualities that made his father famous as an engineer and promoter, his active mind conceived new ideas and solved difficult problems that the most skilful shipbuilders rejected as chemerical and impossible of demonstration. He was born in Hoboken, N. J., Oct. 18, 1787, in the very year when his father saw the crude-looking boat of John Fitch moving up the Delaware, and as a lad of seventeen, he assisted in the construction of the first screw steamboat. Two years later, full of ambition and daring he took the "Phoenix" from New York to Philadelphia by sea in June, weathering the raging storm which overtook him, but at once solving the great problem of ocean navigation. Barred, as he and his father were, from open competition on the Hudson, owing to the monopoly of Livingston they determined simply to take their boat around to the Delaware, and pushed boldly out into the Atlantic, thus out of their deep discouragement, snatching immortal honor.

It was now as a builder of steamboats that Robert L. Stevens made himself famous, each successive boat constructed by him being faster, until, in 1832, with the magnificent "North America," using forced draft, he obtained a speed of fifteen miles an hour.

In 1821 he originated the present form of ferry boat and ferry slips, making his boats with guards encircling them throughout, and constructing the ferry slips with spring piling and spring fenders, the same methods, without any change whatever being still in use. In adopting the overhead working beam (walking beam) of Watt to navigation, he made important improvements, inventing and applying, in 1818 the cam-board cut off, substituting, in 1821, the gallows frame that is now used for the column that supported the working beam, and making that beam of wrought iron strap, with a cast iron centre instead of purely of cast iron. This he improved in 1829 into the shape that is now universally used. He lengthened the proportionate stroke of the piston, and invented the split water-wheel in 1826. In 1831 he invented the balance valve, which was a modification of the Cornish double-boat valve, and is now always on the beam engine. He placed the boilers on the wheel guards, and over the water, improved the details in every part, and finaly left the American working-beam (or walking beam) engine in its present form. At the same time he strengthened the boiler, beginning with a pressure of two pounds to the square inch, and increasing the strength of the boiler so that fifty pounds could be safely carried. He made the first tubular boiler in 1821, and was among the first to use anthracite coal. In the hulls of vessels he gradually increased the amount of iron fastening until it was finally more than quadrupled, increasing the strength of vessels while diminishing their weight. He reduced the vibration of the hulls by the masts and rods that are now used, and added greatly to their strength by his overhead truss-frames.

From 1815 to 1840 he stood at the head of his profession in the United States as a constructor of steam vessels and their machinery, making innumerable improvements which were generally adopted. In the address of President Charles King, already referred, he said in closing: "Robert L. Stevens will be remembered as the greatest American mechanical engineer—a most intelligent naval architect—to whom the world is indebted for the commencement of the mightiest revolution in the methods of modern naval warfare."

Mr. Stevens constructed what is known as the Stevens Battery, and his invention of the elongated shell are facts familiar to most American readers, a description of which is unnecessary in a work of this character.

CHAPTER V

ROBERT FULTON—HIS SUCCESSFUL EFFORTS IN THE DEVELOPMENT OF STEAM NAVIGATION WITH THE ASSISTANCE OF ROBERT L. LIVINGSTON.

"Godfrey taught seamen to interrogate
With steady gaze, though tempest-tossed the sun,
And from his beam true oracle obtain:
Franklin, dread thunderbolts, with daring hand.
Seized and averted their destruction stroke
From the protected dwellings of mankind,
Fulton by flame compell'd the angry sea."

The name of Robert Fulton, like that of Hendrick Hudson, will ever be associated with the river named in honor of its discoverer. The two names are indissolubly linked together:—one discovered, the other utilized the discovery by developing its resources and commercial advantages.

It does not in the least detract from the noble efforts of his predecessors to award to Robert Fulton the unstinted praise for his successful achievements in steam navigation. It was his good fortune not only to profit by the experiments of his predecessors, but to have as his associate one of the most influential and enterprising men in the State of New York, and a man of almost unlimited financial resources.

Cadwallader D. Colden said of Fulton: "To the splendid list of eminent and distinguished Americans must be added the name of Robert Fulton, who, by the power of his native genius, and a spirit of adventurous perseverance, from which no difficulties could deter, nor discouragements dishearten, finally succeeded in bringing to perfection the greatest, because the most valuable invention of modern times; an invention, the immense importance of which had secured him while living, a well-earned celebrity in both hemispheres, and which will transmit his memory with grateful recollections to the latest posterity Always occupied with plans of public utility, his fertile genius has achieved what before he appeared was considered as equally impracticable to realize, as the vision of the enthusiast or the dreams of the alchymist. By the truly wonderful combination of

PORTRAIT OF ROBERT FULTON
Painted by Himself

mechanical powers, this American Archimides has constructed for the protection of his country a bulwark of defence more powerful than the machines of the Mathematician of Syracuse.

Robert Fulton was an inventor and promotor of steamboat navigation; whether the first or last is a matter of little moment; the fact remains that he succeeded where others failed. While he had the co-operation and financial support of Robert L. Livingston, he possessed the practical mind, the inventive genius and executive ability to direct his operations to a successful end. No one can dispute the fact that he demonstrated the practicability of steam navigation on the Hudson River, and opened this great waterway to the commerce of the world. He possessed two remarkable gifts—art and mechanical ingenuity—seldom found in one individual.

Robert Fulton was born in Little Britain, Lancaster County, Pa., in 1765, his parents being both natives of Ireland. At the age of seventeen he adopted the profession of portrait and landscape painter, but devoted a considerable portion of his time to mechanical pursuits. In his twenty-second year he visited England with a view of improving himself in art by the instructions of his countryman, Benjamin West, the famous portrait painter. While there he made the acquaintance of the Duke of Bridgewater, Earl Stanhope, and Watts, the inventor of the steam engine, and partly through their influence he was led to devote his attention more exclusively to mechanical engineering. As early as 1793 he had conceived the idea of propelling vessels by steam, and refers in his manuscripts with great confidence to its practicability, but did not at that time find a suitable opportunity for putting his views into practice. His time was much engrossed in devising methods of superseding the locks in canals by plans of double incline, for which he obtained a patent from the British Government in 1794. In the same year he obtained patents for flax-spinning and rope-twisting machines and various other mechanical inventions. His plans for improvement in canal navigation were strongly recommended by the British Board of Agriculture of which Sir John Sinclair was President. In 1797 he removed to Paris and remained for seven years in the house of Joel Barlow, the American Minister at the Court of France, prosecuting his scientific studies. During this period he projected the first panorama ever exhibited in Paris, and made important improvements in submarine explosives. These experiments were further continued in America, but although Congress voted him $5,000 for prosecuting them his plans were finally declared impracticable. While residing in Paris he was fortunate in making the acquaintance of Chancellor Livingston, and from that time forth concentrated all his energies to the development of steam navigation.

While Chancellor Livingston devoted much of his own time and talents to the advancement of science, and the promotion of the public good, he was fond of fostering the discoveries of others. The resources of his ample fortune were afforded with great liberality wherever he could apply them to the support and encouragement of genius. He entertained very clear conception of what would be the great advantages of steamboats on the large and extensive rivers of the United States. He had watched the progress of Fitch, Reed, and others, with the deepest interest; and in 1797, the year following Fitch's experiments on the Collect Pond, in New York, he was engaged with an Englishman named Nesbit in experimenting in steam navigation. They built a boat on the Hudson River at a place known as DeKoven's Cove or Bay, about half a mile below Tivoli or Upper Red Hook Landing. Brunet, the engineer of the Thames Tunnel, and father of the originator of the Great Eastern Steamship, was the engineer. With men of such skill and knowledge as these, Livingston felt very confident of the result, but the enterprise was not successful. While Livingston was engaged in these experiments he was interrupted by his appointment as United States Minister to France. He had in the meantime made considerable progress, and invested large sums of money in the enterprise with poor results. Finally, in 1798, he believed he had accomplished his object, and represented to the Legislature of New York that he was possessed of a mode of applying the steam engine to propel a boat on new and advantageous principles; but that he was deterred from carrying it into effect by the uncertainty and hazard of a very expensive experiment unless he could be assured of an exclusive advantage from it should it be found successful.

The Legislature, in March, 1798, passed an act vesting Mr. Livingston with the exclusive right and privilege of navigating all kinds of boats which might be propelled by the force of fire or steam, on all waters within the territory and jurisdiction of the State of New York, for the term of twenty years from the passing of the act upon the condition that he should, within one year build such a boat, the means of whose progress should not be less than four miles an hour. Mr. Livingston, immediately after the passage of this act, built a boat of about thirty tons burthen, which was propelled by steam, but as this boat failed to fulfil the conditions of the law in regard to speed she was abandoned.

Soon after Chancellor Livingston's arrival in France, Fulton was induced to turn his attention to the subject of steam navigation by the representation of the advantages which would be derived from navigation by steam in this country, by his account of the approaches to success which he had made in his experiments, and by the pecuniary support which the Chancellor's wealth enabled him to offer.

After a careful investigation of the several methods that had been already tried it was finally determined to build an experimental boat, which was completed in the spring of 1803; but when Mr. Fulton was on the point of making an experiment with it an accident happened to the boat, the woodwork not having been framed strong enough to bear the weight of the machinery and the agitation of the river; and when the machinery was placed on board the boat sank. The accident did the machinery very little injury, but they were obliged to construct a new hull, in which the machinery was finally placed. She was completed in July. Her length was 66 feet; width, 8 feet. Early in August Mr. Fulton addressed a letter to the French National Institute inviting them to witness a trial of his boat, which was made in the presence of a great multitude of the Parisians. The experiment was entirely satisfactory to Mr. Fulton, though the boat did not move altogether with as much speed as he expected.

Such entire confidence did he acquire from the experiment that immediately afterwards he wrote to Mr. Watt, and to Mr. Bolton, of Birmingham, England, ordering certain parts of a steam engine to be made for him and sent to America. He did not disclose to them the purpose for which the engine was designed; but his directions were such as would produce the parts of an engine that might be put together within a compass suited for a boat. Mr. Livingston had written to his friends in this country, and through their influence an act was passed by the Legislature of the State of New York, on the 5th of April, 1803, by which the rights and exclusive privileges of navigating all the waters of that State, by vessels propelled by fire or steam, granted to Mr. Livingston by the act of 1798, were extended to him and Mr. Fulton for a term of twenty years from the date of the new act. By this law the time of producing proof of the practicability of propelling by steam a boat of twenty tons capacity at the rate of four miles an hour, with steam and against the ordinary current of the Hudson, was extended two years, and by a subsequent act the law was still further enlarged.

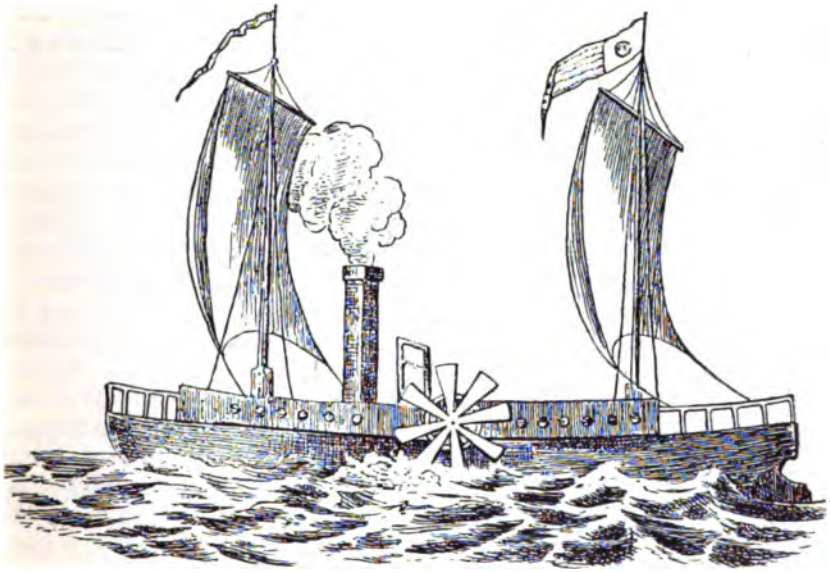
Fulton began the construction of his first American boat in 1806, soon after his arrival in this country, and this was launched from the shipyard of Charles Brown on the East River. She was 130 feet long, 18 feet beam, 6 feet hold, and provided with a single engine, built by Boulton & Watt in England. Mr. Livingston and Mr. Fulton had invited many of their friends to witness the first trial. Nothing could exceed the surprise and admiration of all who witnessed the experiment. The minds of the most incredulous were changed in a few minutes. Before the boat had gone a quarter of a mile the greatest skeptic must have been converted. The man who, while he looked on the expensive machine, thanked his stars that he had more wisdom than to waste his money, on such idle schemes, changed the expression of his features as the boat moved from her wharf and gained her speed, and his complacent expression gradually changed into one of wonder. The jeers of the ignorant, who had neither sense nor feeling enough to suppress their contemptuous ridicule and rude jokes, were silenced for a moment with vulgar astonishment, which deprived them of the power of utterance till the triumph of genius extorted from the incredulous multitude which crowded the shores, shouts and acclamations of congratulation and applause."

A corespondent of the Cincinnati *Gazette* in 1880 says:

"Fulton's first successful boat was called—not the 'Clermont,' but the *Katharine*, of Clermont, after Fulton's wife, Katharine Livingston, of Clermont Manor. I read the name so painted, having been a passenger on the first regular trip made by her down the Hudson. As there are few survivors of that notable event which occurred in 1807, an account of it may gratify your readers. I was a student at Union College, Schenectady, and arrived at Albany in charge of a maiden lady of mature years. She never was then navigated by sloops, and on reaching Albany there was no vessel in port. The lady accordingly went to a friend's house, while I took up my quarters at a tavern. During the night the Katharine arrived from Kinderhook, a few miles down the river. She had made her trial trip the previous fall, being then a mere skeleton. The winter was spent in fitting her up. She was about the size and shape of an ordinary canal boat, painted a light color, and provided with a small upright engine. She was advertised to leave for New York at 9 o'clock on the morning after her arrival. I at once determined to take passage. My fair charge, with the proverbial dilatoriness of her sex, was slow in getting ready, and when we reached the wharf the steamer was out in the stream. She stopped, however, in response to the signal, made by ourselves and other persons gathered on the bank and we went out to her in a skiff. There did not seem to be much excitement in Albany, but at Hudson, where the engineer showed the capacity of the craft by turning her about and steaming a little way up the river, a great crowd was gathered. There were about fifty passengers on board, quite a large proportion being boys and young men. I was to land at Kingston, seventy-five miles below Albany. Before reaching this place the boat ran aground, and it took twelve hours of hard work to get her afloat again. Fulton was on board. He was plainly dressed, and wore a boot on one foot and a shoe on the other. He appeared buried in thought, and spoke to no one. Shortly after the boat left Kingston where I quitted her, her boiler burst, but as it was a sheet iron affair no one was hurt. She was taken to New York for repairs, where I saw her about a week later, having made the remainder of my voyage in a sailing vessel."

An American magazine published many years ago contained a copy of a pen and ink sketch by Fulton, and gave the following description of the crude sailing craft: "With a model resembling that of a Long Island skiff, it was decked for a short distance at stem and stern. The engine was open to view, and from the engine aft, a house like that on a canal boat was raised to cover the boiler and the apartment for the officers. In these, by the addition of a few berths the passengers were accommodated. There were no wheel guards. The rudder was of the shape used in sailing vessels, and moved by a tiller. The boiler was of the form used in Watt's engines, and was set in masonry. The condenser was of the size habitually used in hand engines, and stood in a large cold water cistern. The weight of the machinery and the great capacity of the cold, diminished most materially the buoyancy of the vessel, but at this point Fulton's ingenuity and fidelity of invention were called into play. To the eye of the world the experiment was successful, yet was so imperfect as to be liable to continued accident and annoyance. The rudder had so little power that the vessel could hardly be managed, and could not be made to veer around even in the whole breadth of the Hudson The spray from the wheels dashed over the passengers, and the skippers of the river craft taking advantage of the unwieldiness of the vessel did not hesitate to cross her course and run foul of her whenever they could do so without violating the law. They felt that they were being defrauded of their just rights by this 'steam interloper,' that could run against wind and tide without the art of sails."

The same writer in his account says: "Before the season closed the wheel was surrounded by a frame of strong beams, and the paddles were covered in, the rudder had taken the shape of a rectangle of large horizontal dimensions; the rudder was worked by a wheel, the ropes from which were attached to the end next distant from the pintles. The vessel, by the last mentioned arrangement became so manageable as to be capable of



THE "CLERMONT," FROM A PEN AND INK SKETCH BY

yours Robt Fulton

veering at Albany; and by the first was more likely to inflict than to receive injury in an encounter with a sailing vessel."

Fulton, in a letter to his friend Mr. Barlow, gives the following account of his trip to Albany: "My steamboat voyage to Albany and back has turned out rather more favorable than I had calculated. The distance from New York to Albany is one hundred and fifty miles: I ran it up in thirty-two hours, and down in thirty. I had a light breeze against me the whole way, both going and coming, and the voyage has been performed wholly by the power of the steam engine. I overtook many sloops and schooners beating to the windward, and parted with them as if they had been at anchor. The power of propelling boats by steam is now fully proved. The morning I left New York there were not perhaps thirty in the city who believed that the boat would ever move one mile an hour, or be of the least utility; and while we were putting off from the wharf which was crowded with spectators, I heard a number of sarcastic remarks. This is the way in which ignorant men compliment what they call philosophers and projectors. Having employed much time, money and zeal in accomplishing this work it gives me as well as you, great pleasure to see it fully answer my expectations. It will give a cheap and quick conveyance to the merchandise on the Mississippi, Missouri, and other great rivers, which are now laying open their treasures to the enterprise of our countrymen; and although the prospect of personal emolument has been some inducement to me, yet I feel infinitely more pleasure in reflecting on the immense advantages that my country will derive from the invention."

One of the invited guests in describing the affair in after years said: "The side-wheel was a clumsy affair; uncovered and with twelve huge paddles, held in their place by a ring half way between their extremities and the hub, that sent water splashing upon the deck with every revolution. The top of the smoke-stack was about thirty feet above the deck,—nearly as high as the two masts, from the rear one of which floated the stars and stripes. Hours before she started a great multitude had assembled along the wharves to witness the expected inglorious ending of what was generally known as 'Fulton's folly.' Shouts of derision and ridicule were heard in every direction; but Fulton's own hand is at the helm; he is pale, but still confident and self-possessed; the boat moves out into the stream; the ponderous machinery thumping and groaning, the wheel frantically splashing and the smoke stack belching like a volcano; the vessel steadily moves; all aboard swing their hats into the air, and give a cheer that is immediately taken up by the entire multitude on land; the crowd remain cheering on the piers until she is out of sight up the Hudson."

A gentleman from South Carolina under date of Sept. 8th, 1807, writes to a friend: "I have now the pleasure to inform you of the particulars of a late excursion to Albany in the steamboat made and completed under the directions of the Hon. Robert L. Livingston and Mr. Fulton, together with my remarks thereon. On the morning of the 19th of August, Edward P. Livingston, Esq., and myself were honored with an invitation from the Chancellor and Mr. Fulton to proceed with them to Albany in trying the first experiment up the river Hudson in the steamboat. She was then lying off Clermont, the seat of the Chancellor, where she had arrived in twenty-four hours from New York, being one hundred and ten miles. Precisely at thirteen minutes past nine o'clock A. M., the engine was put in motion, when we made head against the ebb-tide and head wind blowing a pleasant breeze. We continued our course for about eight miles, when we took the flood, the wind still ahead. We arrived at Albany about 5 P. M., being a distance from Clermont of forty-five miles, (as agreed upon by those best acquainted with the river), which was performed in eight hours, without any accident or interruption whatever. This decidedly gave the boat upwards of five miles an hour, the tide sometimes against us, neither sails nor any other implement but steam used.

"The next morning we left Albany with several passengers on the return to New York, the tide in favor, but the wind ahead. We left Albany at twenty-five minutes past nine o'clock A. M., and arrived at Clermont in nine hours precisely, which gave us five miles an hour. The current on returning, was stronger than when going up. After landing us at Clermont Mr. Fulton proceeded with the passengers to New York. The excursion to Albany was very pleasant, and represented a most interesting spectacle. As we passed the farms on the borders of the river every eye was intent; and from village to village, the heights and conspicuous places were occupied by sentinels of curiosity— not viewing a thing they could possibly anticipate any idea of, but conjecturing about the plausibility of the motion. As we passed and repassed the towns of Athens and Hudson we were politely saluted by the inhabitants and several vessels, and at Albany we were visited by His Excellency the Governor, and many citizens. Boats must be very cautious how they attempt to board her when under way, as several accidents had occurred nearly, when boarding her. To board ahead will endanger a boat being crushed by the wheels; and no boat can board astern. The difference between the wake of 'Neptune's Chariot' and that of a common water-carriage, is very materially open for observation, as when you approach the first, you will be told by anticipation to pay your respects to a lady in the 'Chariot,' as you will be readily notified by the expansion of a fan, which forms the dimensions of her wake; but moving with great impetuosity from the warm repulsion. It is a curious fact; it only spreads by an aquatic latchet being sprung by the kicking of the horses. I may now venture to multiply and give you the sum total. She draws to the depth of her wheels two feet of water; one hundred feet deck for exercise, free of rigging or any incumbrances. She is unquestionably the most pleasant boat I ever went in. In her the mind is free from suspense. Perpetual motion authorizes you to facility of a clock; and the noise, when on board, is not greater calculate on a certain time to land; her works move with all the ease of a vessel sailing with a good breeze.''

The following letter of instructions to Capt. Brink of Saugerlies, was for many years and probably is still in the possession of his descendants:

New York, October 9, 1807

Capt Brink

''Sir. Enclosed is the number of voyages which it is intended the boat should run the season. You may have them published in the Albany papers. As she is roughly made, and every one except Jackson under your command you must insist on each one doing his duty or turn him on shore, and put another in his place. Everything must be kept in order—everything in its place, and all parts of the boat scoured clean. It is not sufficient to tell men to do a thing, but stand over them and make them do it. One pair of good and quick eyes is worth six pair of hands in a commander. If the boat is dirty or out of order, the fault should be yours. Let no man be idle when there is the least thing to do, and make them move quickly.

''Run no risque of any kind; when you meet or overtake vessels beating or crossing your way always run under their stern if there is the least doubt that you cannot clear the head by fifty yards or more.

''Give the amount of receipts and expenses every week to the Chancellor.

''Your most obedient,

''Robert Fulton.''

The first announcement in Albany of Fulton's ''Steam Boat'' appeared in the Albany *Gazette* of September 2, 1807, as follows:

The North River Steam Boat will leave Paulus Hook Ferry on

Friday, the 4th of September, at 9 in the morning, and arrive at Albany on Saturday at 9 in the afternoon. Provisions, good berths and accommodations are provided. The charge to each passenger is as follows:

To Newburg 3 dolls., time 14 hours.
" Poughkeepsie 4 dolls., time 17 hours.
" Esopus 5 dolls., time 20 hours.
" Hudson 5 1-2 dolls., time 30 hours.
" Albany 7 dolls., time 36 hours.

"For places apply to William Vandervoort, No. 48 Cortlandt street, on the corner of Greenwich street."

The Albany *Gazette* in its issue of Oct. 8, 1807, contained the following notice:

"Friday, Oct. 2, 1807, the Steam Boat left New York at 10 A. M., against a stormy tide, very rough weather, and a violent gale from the north. She made a heading beyond the most sanguine expectations, and without being rocked by the waves.

"Arrived at Albany, Oct. 4, at 10 o'clock P. M., being detained by being obliged to come to anchor owing to a gale, and having one of her paddles tore away by running foul of a sloop."

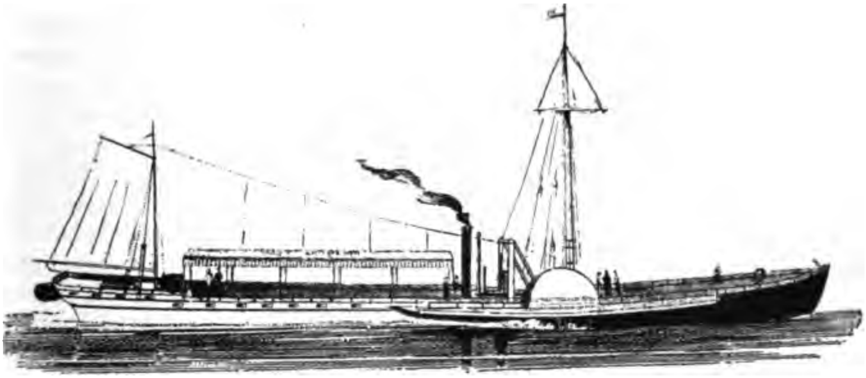
"During the winter of 1807-8, the Clermont was almost wholly rebuilt. The hull was considerably lengthened, and covered from stem to stern with a flush deck. Beneath this, two cabins were formed, and surrounded by double ranges of berths fitted up in a manner then unexampled for comfort. Her name was changed to the 'North River.' The vessel was then advertised to run at stated periods between New York and Albany as a packet, the first time of departure being the first Wednesday in May. On that day Fulton was on board. The first marked incident was the leaving of several passengers who had ventured to trust to the want of punctuality, then usual in the departure of vessels. The rule of starting at an exact time was then enforced for the first time, and from that rule there was, for the future, no deviation. One or two of the dilatory parties jumped into a boat that was towing astern, and the others were left behind.

"The whole passage of the first trip was made in less than forty hours, including a delay of two hours at Chancellor Livingston's seat, at Clermont, on the Hudson. Symptoms of difficulty were manifested, however, even on the upward passage. Mr. Fulton appeared anxious and abstracted. Finally steam began to make its appearance in very minute jets through the joints of a wooden trunk that was first considered by the passengers as the ease of the boiler. It was at last found to be the boiler itself, and it was whispered that Fulton had been overruled by his associates, and that a clylinder of wooden staves containing fire-place and flues of copper had been substituted for the boiler of Watt instead of replacing it by a new boiler of copper. This form of boiler had been proposed, but as far back as we can learn, had never been used by Watt. On the return voyage the leaks in the boiler continued to increase; the speed of the vessel although aided by a flood in the river, became less and less; and after fifty-seven hours of struggling, the engine ceased to work. The vessel was then at the foot of Christopher street. The flood-tide made itself felt in opposition to the boat's progress, and the passengers considered it better to make a landing and find their way on foot to the peopled parts of the city.

"On the upward passage the officer in command was Captain Jenkins. During the downward voyage Capt. Wiswall came on board and assumed command, replacing Captain Jenkins. As the vessel approached upper Red Hook, while Wiswall was doing his best to appear to advantage before the owners, the vessel grounded. Blame was laid by him on the pilot, which led, after a torent of vituperation on each side, to blows, in which one of the parties was knocked down, and one received a black eye. This was the first and last instance of insubordination in the line. Besides the two vessels already named, Fulton also constructed ferry boats to run between New York and New Jersey, a boat for the navigation of Long Island, and five for the Hudson River."

A resident of Catskill in Greene County, N. Y., in 1857, made the following statement: "I am, as far as I know, the only person now living, who was on board the first steamboat on her first trip made by the old North River, the first passenger boat propelled by steam

"The craft employed by Mr. Fulton on her trial trip (called the Clermont, but probably never registered) was taken to what was then called Lower Red Hook, and in the winter of 1807 and 1808, was hauled out on ways to be enlarged and converted into a commodious steamboat. The alterations and enlargements were made by ship carpenters of the city of Hudson during the winter and spring. She was launched about the first of May, and called the '*North River.*' She was taken down to New York by Capt. Samuel Jenkins, who had her in temporary charge until 'Captain,' afterward styled 'Commodore' Wiswall, should be able to assume command. On her arrival in New York she was taken to the dock at the foot of Dey street, where the machinery was placed on board, and the cabin and ship carpenters' work were completed. This was done with a rapidity which in those days was considered extraordinary. Mr. Fulton himself over-



ROB^T FULTON'S STEAM BOAT, THE NORTH RIVER or CLERMONT, 1808.

From a sketch by Joseph Dyer Pub^d in Woodcroft's origin & progress of Steam Navigation seeing and attending to every part. He was usually on board as early as five o'clock in the morning, and would remain there almost the entire day. I never knew a more industrious, indefatigable, laborious man.

"Several trials were made, and one of them, when going up the river at the rate of six or eight miles an hour. Mr. Fulton stood looking over the bow, watching the motions and speed of the boat, when suddenly he whirled, and said to a friend who stood near him, with great enthusiasm: 'My friend, she is a fine boat, and our success is certain.'

"Commodore Weswall was now in command. At the time appointed (9 o'clock A. M.) for her departure for Albany, Chancellor Livingston, with a number of mutual friends, came on board, and after a good deal of bustle and confusion the boat was got out into the stream, and headed up the river. Steam was put on, and sails were set; for she was provided with large square sails, attached to masts, that were so constructed that they could be raised and lowered as the direction and strength of the wind might require. There was at this time a light breeze from the South, and with steam and sails, a very satisfactory rate of speed was obtained. Fast sailing sloops were passed with ease; the machinery worked finely, and everything seemed to promise well. After a time, however, it was discovered that the steam was escaping from the boiler. This boiler was constructed of wood; a cylinder, perhaps twenty feet long and ten feet in diameter, bound with heavy iron bands, with iron tubes extending from the lower part into the furnace. The heat imparted to the iron bands by the steam produced a shrinking of the wood directly under them, whilst the spaces between them would swell from moisture imparted by the steam, so that the edges of the planks would be uneven, having open spaces through which the steam escaped. There seemed to be but one opinion, viz.: that the enterprise would prove a failure. One man remarked: 'Fulton will never succeed, but it is all well enough for him to make the experiment He is only sporting with the Chancellor's money, who has enough to experiment upon without injuring him.' Within two years this same gentleman was a large stockholder in the opposition boats started by an association in Albany. These boats, however, were in a short time laid up under an injunction issued by the Chancellor, and were never afterwards run on the river.

"After three days stay in Albany, spent in making some repairs, and attention to the machinery, caulking the boiler to prevent the escape of steam and supplying deficiencies discovered on the passage, work was commenced and prosecuted with about the same speed and success. When within about thirty miles of

New York, the tubes that run from the boiler into the furnaces, one after another gave way until the fires were entirely extinguished, and the remainder of the passage was made by sails. On her return to New York she was laid up until a new boiler could be constructed. This was made of heavy sheet copper, and completed in about two months' time, when she was again started, and made her trips regularly in twenty-four to thirty hours. The landing of passengers at the different points on the river was effected with considerable trouble and great loss of time."

The "North River"—the reconstructed Clermont—was 150 feet in length, 18 feet wide and registered 166 tons. The Hudson *Bee* of July 2, 1808, gave the following description of the reconstructed Clermont.

"*The Steam Boat* is certainly an interesting curiosity to strangers. To see this large and apparently unwieldy machine, without oars or sails, propelled through the element by invisible agency, at a rate of four miles an hour, would be a novelty in any quarter of the globe; as we understand, there is none in Europe that has succeeded on the plan upon which this is constructed. The length of the boat is 150 feet, and her width in proportion, so as not too much to impede her sailing. The machine which moves her wheels is calculated, we believe, a twenty horse machine, equal to the power of so many horses, and is kept in motion by steam from a copper boiler 8 or 10 feet in length. The wheels are on each side, similar to those of water mills, and under cover; they are moved backward and forward separately or together at pleasure. Her principal advantage is in calms, or against head winds. When the wind is fair, light square sails, etc., are employed to increase her speed. Her accommodations (52 berths, besides sophas, etc.), are said to be equal or superior to any vessel that floats on the river, and are necessarily extensive, as all the space unoccpied by the machinery is fitted in the most convenient manner. Her route (between New York and Albany) is a distance of 150 miles, which she performs regularly twice a week, sometimes in the short period of 32 hours, exclusive of detention by taking in and landing passengers. On her passage last week she left New York with upwards of 100 passengers, and Albany with 80 or 90. Indeed, this *aquatic stage* from Albany with the Experiment of this city bids fair to attach the greater part of the travellers which pass the Hudson, and afford them accommodations not exceeded in any other part of the world."

The New York *Evening Post* during all of Fulton's experiments (1807-1808), contained simply one short notice of the "Steam Boat," announcing her arrival in New York on one occasion with 80 passengers. It did, however, through an advertisement in its own columns, discover an important rival to Fulton, and in an editorial of June 9, 1808, referred to the invention as follows:

"WADSWORTH'S NEW INVENTED BOAT. In our advertising columns will be seen proposals to sell the patent right to the use of this Boat for the North River, and the owner now has a model for exhibition at the Phoenix Coffee House. We have seen the model both in the room and on the water. The following comparitive facts are collected to submit to the public:

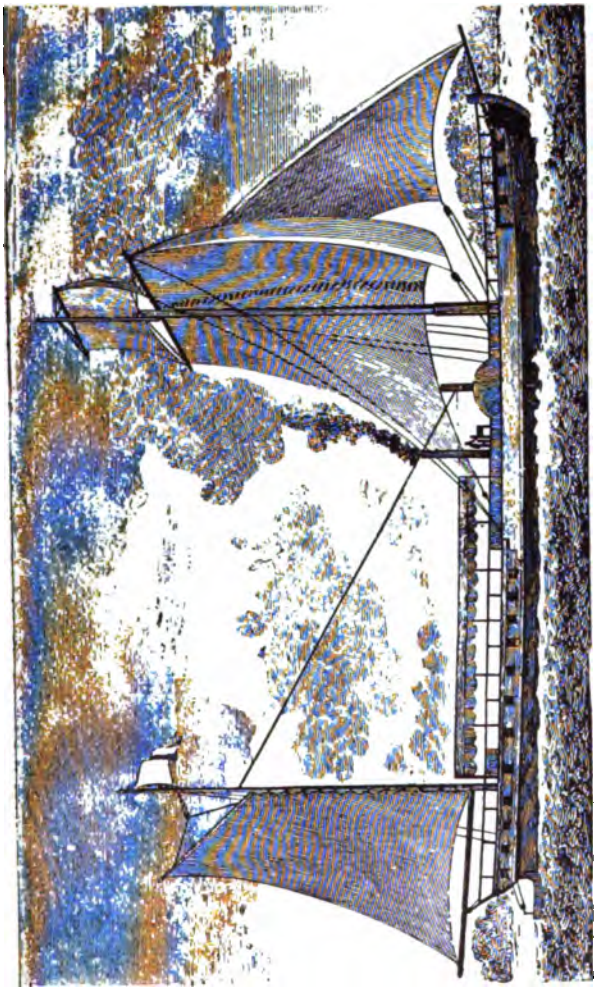
"Fulton's steam boat, propelled as it is, by a steam engine, having the power of 21 horses of between 15 and 20 tons weight, and costing $15,000, will only go at the rate of about 2 miles an hour against the same wind and the same current.

"Candour requires us to mention that the statement respecting Mr. Fulton's boat is derived from report, but very direct, and one which we believe is entitled to full credit. One thing, however, we fear not to say, that the vast and decided superiority of Wadsworth's Boat will, we think, be instantly obvious to every beholder. Mr. Fulton deserved, and he has received great encouragement; but Wadsworth deserves, and we hope he will receive more."

The inventor who advertised to sell the right to use his boat on the Hudson was evidently not aware that the *exclusive right* to navigate the waters of the Hudson and other rivers in the State by means of vessels propelled by steam had been granted to Fulton and Livingston by an Act of the State Legislature.

The History of Albany County, N. Y., says: "In the spring of 1808 the Clermont made her appearance entirely remoddled and enlarged. Her accommodations were ample for 100 passengers. In her original construction she had a strange appearance. Her paddle-wheels were without houses, and cross-heads were connected with the piston instead of walking beams now in use. Shortly after the successful trip was made, a company was formed called the North River Steamboat Company, but generally known as the Fulton Line. This Company, in 1809, built the Car of Neptune, 295 tons. From this date to 1817, the Hope, Perseverance, Paragon, Richmond, Firefly, and Chancellor Livingston were placed upon the river by the Fulton Line. The last of these boats—the Chancellor Livingston, was the largest by 150 tons, of any boat which had been used, having a carrying capacity of 495 tons."

Another boat, known as the "Fulton," was built two years previous to the Livingston. The New York *Evening Post* of June 4, 1814, contained the following notice:



THE PARAGON STEAMBOAT, 1808.

"The public are respectfully informed that the subscriber has commenced running the steamboat 'Fulton' between the cities of New York and Albany for the accommodation of passengers.

"This boat was built for the purpose of plying between New York and New Haven, but will be employed on the Hudson River until a cessation of hostilities [War of 1812-15], enables the proprietors to put her on her destined route.

"The Fulton is handsomely fitted up and furnished, and her speed exceeds the most sanguine expectations of the proprietors or patentee. The complement of passengers is limited to 60, and the price of passage, therefore necessarily raised to ten dollars.

"The Fulton will start from the foot of Cortlandt street every Saturday morning precisely at 11, and will arrive in Albany every Sunday morning, and in New York every Wednesday morning.

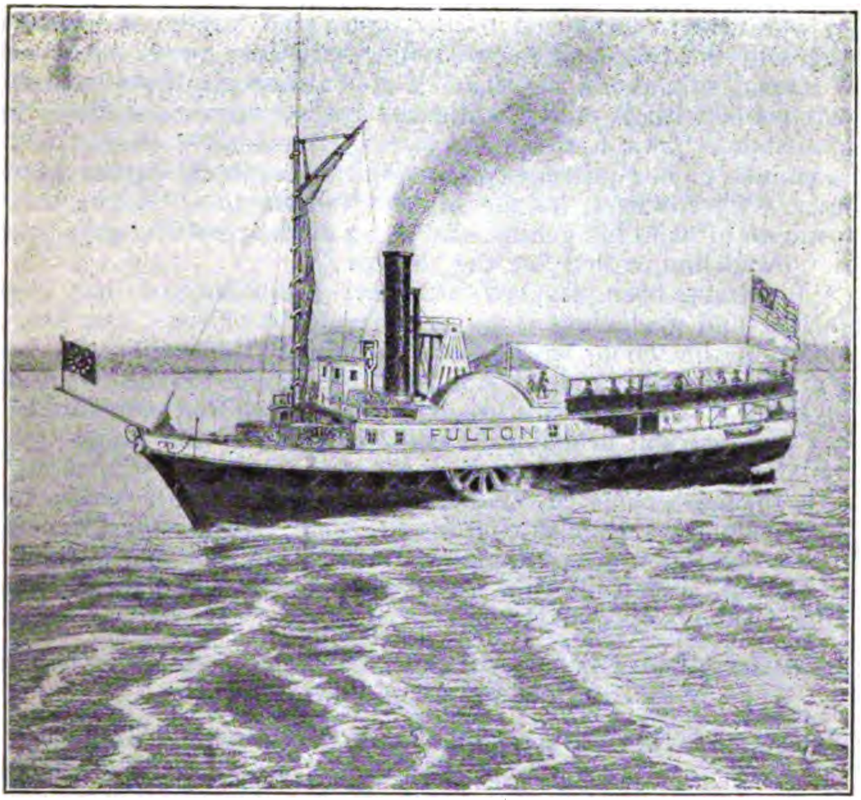
One of the days between Wednesday morning and Saturday morning the 'Fulton' will go out on Parties of Pleasure. Notice will be given on the day previous to the time of starting.

"Elihu S. Bunker."

The Fulton was sloop-rigged, one mast, and depended on her sails to accelerate her speed. She was 134 feet in length, 26 feet beam, with rails along her sides, and measured about 30 feet outside her guards. She had a square engine with no frame, and it did not extend much above the paddle-box side; her wheel was about six feet stroke. Her bow was like that of a sloop, very full above, but receding at an angle of about forty-five degrees. She carried on her bow a figure-head of Fulton. Cadwallader D. Colden in his description says: "She is nearly four hundred tons burden [exact measurement, 387 tons], built with uncommon strength, and is fitted up with great convenience and elegance. She is the first steamboat that had a round bottom like a ship. This form was adopted because, for a great part of the route she will be as much exposed as she would be on the ocean. It was necessary, therefore to make her a perfect sea boat."

The Fulton continued to run between New York and Albany during the summer of 1814, and in the spring of 1815, made her first trip on Long Island Sound.

The New York *Evening Post* of March 25, 1815, in describing her return trip said: "And from the time she left the port of New Haven, till she made Sand's light, they did not see any land so as to distinguish what it was. The wind blew a gale from the south, which was directly ahead, and raised a very rough sea, but the boat, notwithstanding the disadvantages which have been enumerated, and under which she continued to labor, encountered it without the least difficulty. The facility with which she passed



THE FULTON 1814

Hell Gate in both instances surprised everybody on board, and satisfied them that no vessel can be so well calculated to navigate the dangerous channel as the steamboat. On the return passage she passed the Gate about half an hour before high water, of course against a tide running at the rate of between three and four knots, yet she worked with as much ease, certainty and quickness as any light or small vessel could have done.

"This passage previously to its being navigated by this vessel was always supposed to be impassable, except at certain stages of the tide, and many a shipwreck has been occasioned by a small mistake in the time. The boat passing through these whirlpools with rapidity while the angry waves are foaming against her bows, and appear to raise themselves in obstinate resistance to her passage, is a proud triumph of human ingenuity. The owners, as the highest tribute they had in their power to offer to his genius, and as an evidence of the gratitude they owed him, called her the 'Fulton.'

"We have been assured that this establishment has cost $90,000, and we believe it may with truth be affirmed that there is not in the whole world such accommodations afloat as the 'Fulton' affords. Indeed it is hardly possible to conceive that anything of the kind can exceed her elegance and convenience. Her passage will probably be made in eight to nine hours."

Sixteen steamboats (counting the reconstructed "Clermont" with the new name of "North River") were built under the supervision of Fulton during his life time; though the Chancellor Livingston was not completed until 1816 she was designed by Fulton. The following list of steamers is given in Cadwallader Colden's Life of Fulton:

STEAMBOATS BUILT IN THE CITY OF NEW YORK UNDER THE DIRECTION AND SUPERVISION OF ROBERT FULTON.

Clermont—length 133 feet, built by Charles Brown—Hudson	1806
North River—length 150 feet; Clermont, rebuilt by Charles Brown—Hudson	1807
Raritan—built by Charles Brown for Raritan River	1807
Car of Neptune—length 175 feet, built by Charles Brown for Hudson River	1807
Paragon—length 173 feet, built by Charles Brown for Hudson River	1811
Fire Fly—length 100 feet, built by Charles Brown for Hudson River	1812
Jersey Ferry Boat—length 78 feet, built by Charles Brown for Hudson River	1812

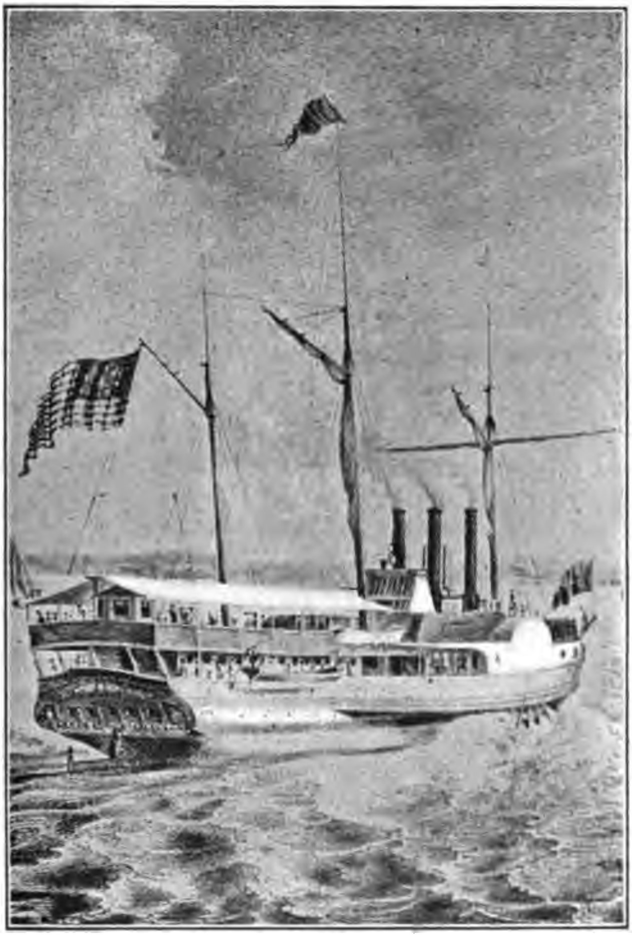
Richmond—length 153 feet, built by Charles Brown for Hudson River	1812
Washington—length 135 feet, built by Charles Brown for Potomac River	1813
New York Ferry Boat—length 78 feet, built by Charles Brown for Potomac River	1813
Nassau Ferry Boat—length 78-6 feet, built by Charles Brown for Brooklyn	1813
Fulton—length 134 feet, Nat Brown, Long Island Sound.	1813
Fulton the First—length 156, Nat Brown, Navy Yard	1814
Olive Branch—length 124, Noah Brown, for New Brunswick, N. J	1816
Emperor of Russia—length 134, Adam Brown	1816
Chancellor Livingston—length 156, Henry Eckford, Hudson River	1816

CHAPTER VI

IMPROVEMENTS IN STEAMBOATS AND INCREASED FACILITIES FOR STEAM NAVIGATION ON THE HUDSON RIVER

The "Chancellor Livingston," built in 1816 under the supervision of Fulton, showed a marked improvement over her predecessors, and was considered at the time the finest steam vessel afloat. She had three smoke-stacks athwartships, and three masts, a bowsprit and jibboom, with yards and topsails on the foremast; the sails being still recognized as a necessary equipment to steam vessels. Her keel was 150 feet long; decks 165 feet, beam 32 feet; draft 7 feet 3 inches; principal or main cabin 54 feet long with closets; forward cabin 30 feet long and 7 feet high; permanent sleeping berths in main cabin, thirty-eight; in ladies' cabin, twenty-four; forward cabin fifty-six; in captain's cabin, on deck, eight; engineer and pilot's three; forecastle, six; cook's six; total, one hundred and thirty-four. Her engine was 75 horse power; diameter of cylinder, 40 inches; length five feet; boiler 28 feet long, 5 feet broad, with two funnels; paddle-wheels 17 feet in diameter; paddle-boards, 5 feet 10 inches long. She had two fly-wheels, each fourteen feet in diameter, connected by pinions and crank wheels. The machinery rose four feet above the deck. This was the last boat constructed under the superintendence of Robert Fulton, but which was not completed until after his death. The following description of the "Chancellor Livingston," appeared in the New York *Evening Post,* March 31, 1817:

"An experiment was made on Saturday between this city and Newburg, a distance of sixty-five miles, which was accomplished in a few minutes less than nine hours and fifteen minutes. The average time to Albany will be about twenty-four hours, or eight miles an hour. The North River Steamboat Company is building this vessel, exceeding 500 tons burthen, and furnished in every respect in the most complete manner, and is entitled to the thanks of a liberal and discerning public. The hull of the Livingston was built by Henry Eckford, and the boiler was built by James P. Allaire. Her cost was $110,000." In 1821 the Chancellor Livingston took up a band of music for the entertainment of her passengers. This was the first introduction of that attraction on the North River boats.



THE CHANCELLOR LIVINGSTON 1815

The New York *Evening Post* of March 14, 1815, contained the following notice:

HUDSON RIVER STEAMBOATS.

The Paragon, Captain Wiswall.
The Car of Neptune, Capt. Roorbach.
The Richmond, Capt. Bartholomew.

In order to accommodate the public these vessels will make four trips in each week during the season of 1815, in the following order:

A boat will leave New York every Monday, Wednesday, Friday and Saturday at 5 o'clock in the afternoon, and leave Albany at 9 o'clock in the morning.

"N. B. The Car of Neptune will commence the season by leaving New York on Saturday, the 13th inst."

The following announcement appeared in the same paper on Nov. 27, 1815:

"The undersigned gives notice that they intend to apply to the Legislature of the State at their next session for an act to incorporate themselves and their associates into a company under the style of the North River Steamboat Company with a capital of Eight hundred and Seventy thousand dollars for the purpose of navigating with Steam Boats the waters of the North River.

Dated 27th day of November, 1815.

Edward P. Livingston,
Robert L. Livingston,
D. Lynch, Jr.

In 1811 the fare from Albany to New York was $8. In 1819 the North River Line carried 16,000 passengers, according to report, the Company paying one dollar each to the State for canal purposes.

In 1824 the Fulton Line, or North River Steamboat Company, added to the line the James Kent and the Saratoga. On the 29th of October, 1821, the Chancellor Livingston grounded on the overslaugh and remained there twenty-nine hours. The *Daily Advertiser* in referring to this event called upon the citizens to exert themselves to deepen the channel, lest the canal, which was fast approaching the city should be carried down below these obstructions.

The exclusive rights to the navigation of the Hudson by steam vessels granted to Fulton and Livingston was the subject of constant discussion for many years. The validity of this right was contested in the courts, and in March, 1824, a decision of the Supreme Court of the United States made the navigation of the

Hudson river free, and abrogated the rights of the North River Steamboat Company, and affirmed the rights of others to navigate the river from certain points with vessels propelled by steam. Soon after the rendering of this decision in 1824 the Union Line was started in opposition to the old line, and during the first year of its organization built and commenced running, the Olive Branch, the United States, William Penn, Bristol and Sandusky.

In 1825 the Hudson River Line was established, and in the three years following, constructed and placed on the line the Constitution, Constellation and Chief Justice Marshall, all magnificent boats for that period, and in 1827-29 added the Independence, Ohio, and the Sun. The Sun was the first boat that ever made the trip from Albany to New York from sun to sun; all other boats up to this time requiring from fourteen to fifteen hours for the same distance.

The first boat to make regular trips from New York to Albany by *daylight* was the Redmond. She was announced to start June 22, 1822, at 6 o'clock A. M., on Monday and Friday; the Chancellor Livingston and Fire Fly left on alternate days at 4 o'clock P. M.

The New York *Evening Post* on January 16, 1824, announced that the James Kent would leave for Poughkeepsie that day and stated that "navigation is still open for the first time since 1787." On March 18, 1825, the same paper stated that "the Steam Boat James Kent arrived from Albany at 10 o'clock this morning, making her passage in fourteen hours and a half." On the same date it was announced that the "Chief Justice Marshall" would leave from the foot of Albany street, North River, at half past four P. M., Tuesdays and Thursdays, adding, "The boat is new, copper boilers and low pressure pumps."

HUDSON RIVER STEAMBOAT ADVERTISEMENTS, JUNE, 1827.

NORTH RIVER STEAM-BOAT LINE FOR ALBANY

The NEW PHILADELPHIA, Capt. John Benson, will leave the foot of Courtlandt on Thursday morning at 6 o'clock. Her regular days of starting are:

From New York.		*From Albany.*	
Tuesday	6 A. M.	Wednesday	6 A. M.
Thursday		Friday	
Saturday		Sunday	

Persons wishing to take passage in this boat are informed that by leaving their names at the steamboat office the day previous to starting they will be called in time to go on board.

The boat comes to at the wharf at Newburgh, Poughkeepsie, Rhinebeck, Catskill and Hudson.

FOR ALBANY.

Hudson River Steam-Boat Line. Daily.

The C. J. MARSHALL, Capt. R. W. Sherman, will leave the foot of Cortlandt Street at 5 o'clock P. M. The CONSTITUTION, Capt. M. Bartholomew, Friday at 5 P. M. The CONSTELLATION, Capt. G. R. Cruttenden, Saturday at 5 o'clock P. M.

A. N. Hoffman, 71 Dey Street.

UNION LINE FOR ALBANY.

Fare in the Cabin $3. *Deck Passengers* $1.50.

The Steamboat SANDUSKY, Capt. Vaughn, will leave the foot of Liberty street this afternoon at 5 o'clock. For passage apply to D. Meeker, Powles Hook ferry house, to Jacob Corliss, 285 Pearl street, or to the Captain, on board.

Slight accidents, without serious results occurred during the early period of steam navigation on the Hudson. The bursting of the boiler of the Constitution in 1828, when opposite Poughkeepsie, created considerable distrust and apprehension regarding the safety of steamboats and as a means of lessening the danger and preventing the loss of life a system of safety barges or tow boats was devised by William C. Redfield, a native of Cromwell, Connecticut, who is said to have been the first to introduce safety barges on the Hudson between New York and Albany. His plan was to have all passenger boats towed by steam barges with sufficient distance between the two as to prevent any possible loss of life in case of a boiler explosion. This suggested the system of tow-boats for conveying freight which was established in 1826, and the fleets of barges and canal boats, sometimes numbering forty or fifty which made so conspicuous a figure on the Hudson River were started by Mr. Redfield, and for thirty years he superintended the first line established. Notice was given about this time that "The Safety Barges will, after the

1st of June be continued as regular passage boats between New York and Albany. These barges are substantial vessels of nearly two hundred tons burthen each with spacious and elegant accommodations, and free from the noise, jarring and heat to which steamboats are subject; and not exposed to the dangers resulting from explosion of steam boilers and other accidents."

On May 30, 1826, it was announced that "the Safety Barge, 'Lady Clinton' will leave the foot of Cortlandt street for Albany and Troy on Thursday morning at 10 o'clock;" and soon after this that the "Swiftsure," Capt. Peck, with the freight barges Albany and Niagara, will leave Lent's Basin for Albany to-morrow at 6 o'clock. Passage on the steamboat $2; on the freight boat $1.

A regular "Morning Line for Albany" was established in the spring of 1827, and the "Steam Boat Sun," Capt. R. G. Livingston, made her first trip on March 30th of that year. The fare to Newburg, 50 cents; Poughkeepsie, $1; Kingston, $1.25; Catskill, $1.50; and Hudson, $1.50; Albany, $2. Breakfast, 25 cents; dinner, 37 1-2 cents; tea, 25 cents.

The same year, 1827, was organized the first regular opposition line on the Hudson known as the "Hudson River Steamboat Line." Connected with this line were the "Independence," "Constitution," "Chief Justice Marshall," and "Constellation."

In 1828 the North River Steamboat Line added the "North America," "Albany," and "New Philadelphia." The North America was fully "up to date" in her construction and equipment. She was 200 feet long, 30 feet beam, provided with two engines; cylinder, 44 1-2 inch diameter, 10 feet stroke; her wheels were 21 feet diameter, and made 24 revolutions per minute.

The "Albany" was 212 feet long, 26 feet beam, one engine, 65 inch cylinder; diameter of wheel 24 feet 5 inches, and made 19 revolutions per minute.

The "New Philadelphia," built by Robert L. Stevens, of Hoboken, N. J., was considered the finest steamer afloat, and contained many of his own improvements and inventions. Allusion has already been made to this magnificent boat and the new departure in form, in the account given by Prof. Renwick. It was a complete revolution in the style of building boats which greatly increased their speed, and which, as Professor Renwick has said "was the commencement of the new models, which, alike in clipper steamers and in clipper ships, have given to both classes of our build and navigation—for there is a great deal, too, in the latter—our superiority over the world."

A strong rivalry sprang up between the different steamboat

PEEKSKILL LANDING ON THE HUDSON 1837

companies, and the North River Steamboat Line offered to carry passengers to Albany for "two dollars and found." In 1829 the Hudson River Line added two more boats, the "Victory" and "Ohio." The strong rivalry that existed led to frequent racing between the opposing lines, which was sometimes attended with disastrous results. The New York *Evening Post* in an account of the race between the Ohio and the DeWitt Clinton strongly condemned the practice.

The first steamboat explosion resulting in loss of life was that of the "Chief Justice Marshall" on April 22, 1830, and, although the cause as reported by the officers was "unknown," accidents of this character were usually the result of trials of speed between the opposing lines. At the time of the explosion, the boat was just leaving the dock at Newburgh. The captain, in his report says: "I have the unpleasant duty to inform you that shortly after leaving the dock at this place, about 7 o'clock, the whole front of our boilers blew out with a most tremendous explosion. Ten persons are badly scalded; three or four so much so that their lives are despaired of. The cause, at present we know not, but can say that the steam was very low, and the boiler well supplied with water at the time; the guage cocks were tried while landing, and the steam blowing off; all is confusion."

The account in the New York *Evening Post* stated that: "The Chief Justice Marshall underwent thorough repairs last winter, and was furnished with a new engine on the low pressure principle, and had a strong copper boiler."

News of the explosion of the boiler of the steamer Calidonia on the Mississippi River was received shortly after this; and the New York *Evening Post,* commenting on the frequency of steamboat accidents, said: "We have to mention another of those melancholy accidents which arise from the unskilful management of a mighty power lately brought into subjection to man. The boiler of the steamboat Caledonia, plying on the Mississippi, exploded on the 22d of April, near the mouth of the Ohio River. By four disasters of the kind, which have occurred in the short space since steamboats began to run."

The "Oliver Ellsworth" exploded her boiler on Long Island Sound in March, 1827, by which accident four or five lives were lost. The New England, a magnificent boat which began running between Hartford and New York in the summer of 1833, exploded both her boilers on the evening of October 9th of that year, killing and wounding some twenty people

The New York *Evening Post,* at a later period says: "Nearly a hundred lives, if our computation is correct, have been lost in the Helen McGregor, three or four on the Huntress, nine on the Chief Justice Marshall, and fourteen on the Calidonia, besides those who will probably die of injuries received It is now about two years since the running of safety barges was discontinued, and it is now resumed in consequence of the demand for this mode of conveyance occasioned by the late accidents."

CHAPTER VII

RIVALRY BETWEEN STEAMBOAT COMPANIES—STEAMBOAT DISASTERS —GREAT IMPROVEMENT IN STEAMBOAT CONSTRUCTION

In 1831 the North River Steamboat Company commenced running the North America as a day boat, leaving the foot of Barclay street at 7 o'clock A. M. The New "Philadelphia" and DeWitt Clinton left at 5 P. M. It was advertised that "Passengers on the night boat for Troy will be sent by stage or steamboats free of charge."

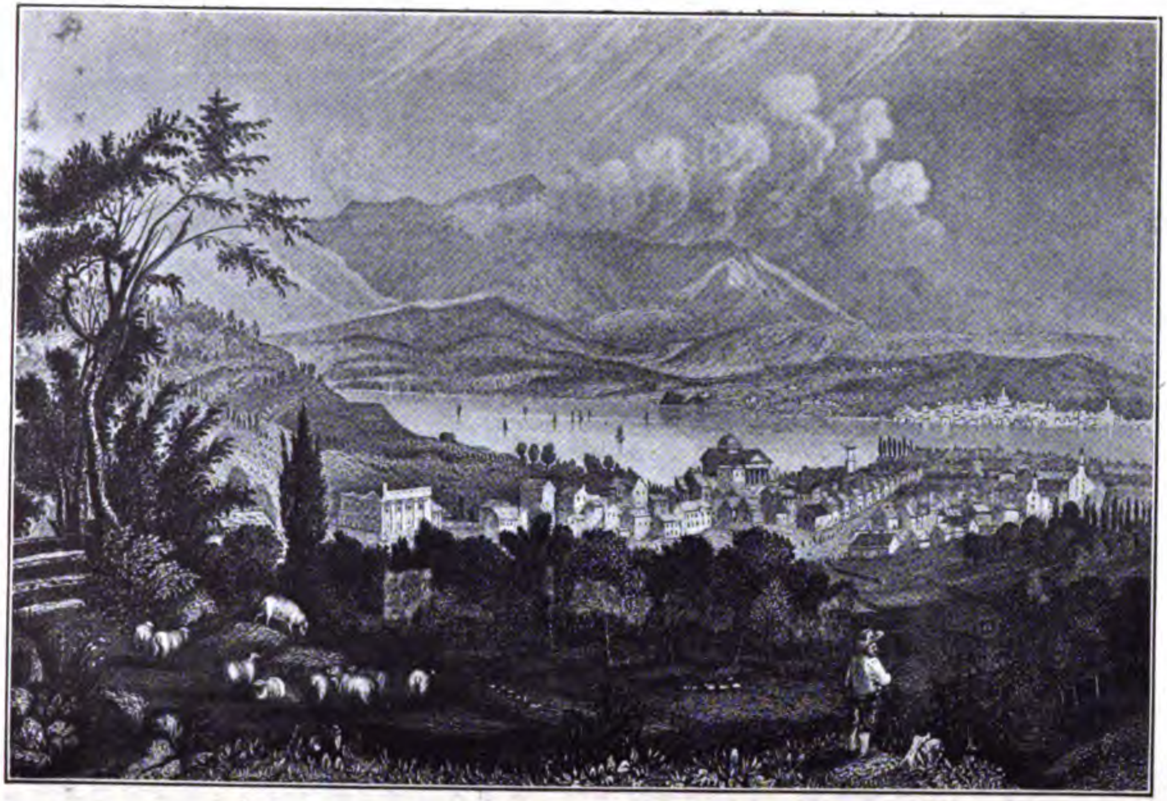
Great advancement had now been made in the speed of boats, and the New Philadelphia and North America, both built by Robert L. Stevens, were two of the fastest boats afloat. On June 10, 1831, the "New Philadelphia" ran from New York to Albany in nine hours and forty-five minutes, including stoppages. She arrived at Newburgh in three hours and forty-seven minutes.

In 1833, the North River Line, the Hudson River Line, and the Troy Line consolidated, and formed the Hudson River Association. The company ran both a day and night line. The steamers Albany, Champlain, Erie, and Novelty, were run as day boats; and the North America, DeWitt Clinton and Ohio as night boats.

The People's Line was established in 1834 as a day line, and as an opposition to the Hudson River Association. Cornelius Vanderbilt was largely interested in this venture. The first boat conected with this line was the Westchester, which was followed in 1835 by the Nimrod and Champion.

In 1835 the People's Line was sold to the Hudson River Association for $100,000, and $10,000 yearly payment for ten years. But in 1836 the People's Line was revived as a night line by Daniel Drew, who purchased the Westchester and Emerald. and the following year the Utica. Steamers of greater tonnage, increased capacity and improved accommodations were added not long after.

With improved capacity and increased speed of the boats, there sprang up a rivalry between the steamboat captains which the owners evidently encouraged, which resulted in frequent accidents and sometimes serious disasters. One of the worst was that of the steamboat Swallow.



VIEW OF HUDSON CITY AND THE CATSKILLS 1835

BURNING OF THE STEAMBOAT SWALLOW.

This occurred on April 7, 1845. The Swallow left Albany on her downward trip at the usual hour. The night was dark and the pilot became confused while going through the western channel near Athens, and ran the boat on a shelve of rocks while going at a high rate of speed; she filled rapidly and was sinking when her rival, the Rochester, came to her assistance and took most of the passengers off, as was supposed at the time A passenger in describing the scene, said: "In less than five minutes by the mercy of God the stern rested on the bottom, the water being above the windows of the after saloon staterooms by darting in the windows. The bow had been forced high and dry upon the rock, and the boat split open amidships, was left rising almost perpendicular upwards, covered with anxious persons clinging to the bulwarks. The steamboat Express came up and took off part of the passengers and in the course of an hour the others were all taken off by the Rochester. The boat is a complete wreck. It was an awful sight when we cast off from the side."

"A final summing up of the passenger list gave the following estimates: The Express took 40, the Rochester 94, and 70 arrived at Albany, leaving 80 to be accounted for. An official investigation showed that the accident was due to the recklessness of the pilot.

In 1836 the "New Line for Albany" ran the Novelty and R. L. Stevens. The People's Line ran the Rochester and Utica and reduced the fare to $1. The competition was sharp and in 1838, appeared the following advertisement in the New York and Albany papers:

FREE TRADE AND YOUNG MEN'S RIGHTS

STEAMERS SUN AND BELLE

OPPOSITION TO IMPOSITION. NO MONOPOLY!!!

The People's Line cut down the fare to 50 cents, and for five or six years following, passengers for Albany could take their choice of routes day or night for fifty cents.

Notwithstanding the legal restrictions racing between the boats of the competing lines continued and accidents were of frequent occurrence. On May 23, 1844, the following notice appeared in the New York dailies:

"The proprietors of the Troy Line would respectfully inform the public that their steamboats will for the remainder of the season depart at their advertised hours, making the usual landing, *and will avoid all racing.* Having, unprepared for the race, beat the finest boat in the world, (so called by the owners), the South America, in a contest sought by her proprietors with both boats of the Troy Line, the Empire and Troy, leaving New York at 7 o'clock A. M.''

This line ran the Knickerbocker, South America and Columbia. An independent opposition line ran the R. L. Stevens.

Alexander Matthews, who, for many years had an office at 165 Greenwich Street, directly opposite the site of the first established Steamboat Opposite, kept and preserved a list of all the ''Passage Boats built and running on the Hudson, between New York and Albany, and New York and Troy from 1807 to 1845. The following is the list:

Clermont, built 1807, enlarged and improved, and named changed to the

North River, 166 tons; completed 1808.

Car of Neptune, 295 tons, built 1809.

Hope, 2 80 tons; built 1811.

Perseverance, 280 tons; built 1811.

Paragon, 331 tons, built 1811; sunk 1825.

Richmond, 370 tons; built 1813.

Olive Branch, 295 tons; built 1815.

Chancellor Livingston, 495 tons; built 1816.

Portland, broken up in 1834, and her engines placed in a new boat named the Portland.

James Kent, 364 tons; built 1823.

Hudson, 170 tons; built 1824.

Sandusky, 289 tons; built 1825.

Constitution, 276 tons; built 1825.

Constellation, 276 tons; built 1825.

Chief Justice Marshall, 300 tons; built 1825; lost on Long Island Sound.

Saratoga, 250 tons; built 1825.

Sun, 280 tons; built 1826; burned 1831.

New Philadelphia, 300 tons; built in 1826 by Robert L. Stevens; later, ran on the Delaware River.

Albany, 298 tons; built 1827.

Independence, 368 tons; built 1827.

North America, 497 tons; built 1827 by Robert L. Stevens, destroyed by ice, 1829.

Victory, 290 tons; sunk in 1845.

DeWitt Clinton, 571 tons; built in 1828; engine taken out and put in Knickerbocker.
Ohio, 412 tons; built 1829.
Novelty, 477 tons; built 1830.
Champlain, 471 tons; built 1832.
Erie, 472 tons; built 1832.
Helen, built 1833; destroyed, 1834.
Robert L. Stevens, 288 tons; built 1835.
Rochester, 491 tons; built 1836.
Swallow, 426 tons; wrecked at Athens April 7, 1845.
Utica, 340 tons; built 1837.
Diamond, 398 tons; built 1838.
Balloon, 204 tons; built 1839.
North America (No. 2), 494 tons; built 1839.
South America, 638 tons; built 1840.
Troy, 724 tons; built 1840.
Columbia, 391 tons; built 1841.
Rainbow, 230 tons; built 1841.
Curtis Peck, built 1842.
Empire, 936 tons; built 1843.
Knickerbocker, 808 tons; built 1843.
Belle, 430 tons.
Express, 288 tons.
Niagara, 730 tons; built 1845.
Rip Van Winkle, 510 tons; built 1845.
Hendrick Hudson, 1,170 tons; built 1845.

A letter prepared by the Secretary of the Treasury of the United States, in answer to a resolution of inquiry of the House of Representatives, June 20th, 1838, made the following report:

"The number of accidents resulting in loss of life or much injury to property from the use of marine steam-engines of every kind in the United States is computed to have been about 260. Of these, 253 are ascertained, and the rest are estimated. Accidents, by explosions and other disasters to steamboats, appear to have constituted a great portion of the whole, and are estimated to have equalled 230, two hundred and fifteen of which are ascertained. The first of these is believed to have occurred in the 'Washington' on the Ohio River, in 1816.

"Since the employment of steamboats in the United States it is computed that 1,300 have been built here. About 260 of these have been lost by accident, as many as 240 worn out, and the rest are running.

"The largest boat in the United States is the 'Natchez,' of 860 tons, and about 300 horse power, designed to run between New

York and the Mississippi. The 'Illinois' and the 'Mattison,' on Lake Erie, are next in size, the first being 755, and the last 700 tons. The 'Massachusetts,' on Long Island Sound, is the next, being 626 tons, and the 'Buffalo,' on Lake Erie, next largest, being 613 tons.

"The whole number of steamboats ascertained and estimated to be in this country (1838) is 800. In England, in 1836, the whole number of steamboats in that country was computed to have been 600. As an illustration of the rapid increase of steamboat business on the Ohio, the steamboat passages through the Louisville Canal, increased from 406 in 1831 to 1,501 in 1837, or about fourfold in six years. Of the 800 steamboats now in the United States the greatest number ascertained to be in any State is 140 in the State of New York.

The greatest loss of life on any occasion in a steamboat was by a collision, and the consequent sinking of the 'Monmouth,' in 1837, on the Mississippi, when 300 lives were lost. The next greatest were by the explosions of the 'Oronoka,' in 1838, on the Mississippi, by which 130 (or more) lives were lost; and of the 'Moselle,' at Cincinnati, Ohio, by which between 100 and 120 persons were destroyed. The number of steamboats built in the United States in 1834, was 88; in 1837 it was 184, having increased over 200 per cent. in three years. The greatest number of steamboats and other steam-machines appear to have been constructed at Pittsburg, Cincinnati, and Louisville on the Western waters, and New York, Philadelphia and Baltimore, on the Atlantic."

From 1845 to 1855, the principal aim of the rival steamboat companies appeared to be to increase the speed of their boats, and every improvement that could be devised in this direction was readily adopted. Stevenson, who visited this country in 1837, was much impressed. He says: "The voyage between Albany and New York is now generally performed in ten hours, exclusive of the time lost in making stoppages, *being at the astonishing rate of fifteen miles an hour* They have effected this great increase of speed by constantly making experiments on the form and proportions of their engines and vessels,—in short by a persevering system of *trial and cover*, which is still going forward; and the natural consequence is, that even at this day, no two steamboats are alike, and few of them have attained the age of six months without undergoing some material alterations."

From 1845 to 1850 the size of the boats was increased from about 200 to over 300 feet in length, and more attention was paid to form and symmetry in their construction. The Isaac Newton, built in 1846, was 341 feet long, and had accommodations for five hundred passengers. Her cost was about $150,000. The Hendrick Hudson, the Alida, the Henry Clay, the Francis Skidder, and other boats of increased dimensions, followed in rapid succession, and the carrying capacity was considered of greater importance than speed, although there was a still further increase in this direction. In 1850 the Isaac Newton was lengthened fifty feet, making her over four hundred feet in length, the largest, at that time of any boat in the country.

Notwithstanding the immense expenditure of money for larger, finer and better boats the competition continued at ruinous rates to the companies and the fares reduced to a mere nominal rate. In 1847 the proprietors of the Alida announced:

"THE ONLY REAL OPPOSITION ON THE RIVER. Fare 50 cents.

And in 1850 the Rip Van Winkle was carrying passengers from New York to Albany for twenty-five cents. In 1847 the Citizens New Day Line ran the Roger Williams and the George Dobson. In 1848 the Santa Claus was added to the People's Line; and in 1850, the Manhattan, Capt. Nelson, was running as an opposition boat. The Henry Clay was built in 1847; in 1851 she was running in opposition to the Armenia, and racing between the two boats was of almost daily occurrence, each trying to make the landings ahead of the other in order to secure the passengers. It was during one of these races with the Armenia, on July 28, 1852, that the Henry Clay took fire, and was burned to the water's edge at a point just below Yonkers. The following is the account as it appeared in the New York *Evening Post,* July 29, 1852:

"The Henry Clay left Albany yesterday morning in company with the Armenia at 7 o'clock, with between 300 and 400 passengers. Neither the exact number nor the names of the passengers can ever be ascertained probably, as no passenger list was kept.

"Although immediately after leaving the wharf it was apparent that the boat was racing. At Hudson the Armenia, by taking the west channel, and not landing, succeeded in getting ahead of the Clay. About half an hour after passing Catskill the Clay overtook the Armenia, and for the following three-quarters of an hour the two boats were running side by side, and it became necessary to use fenders constantly to prevent damage from collision.

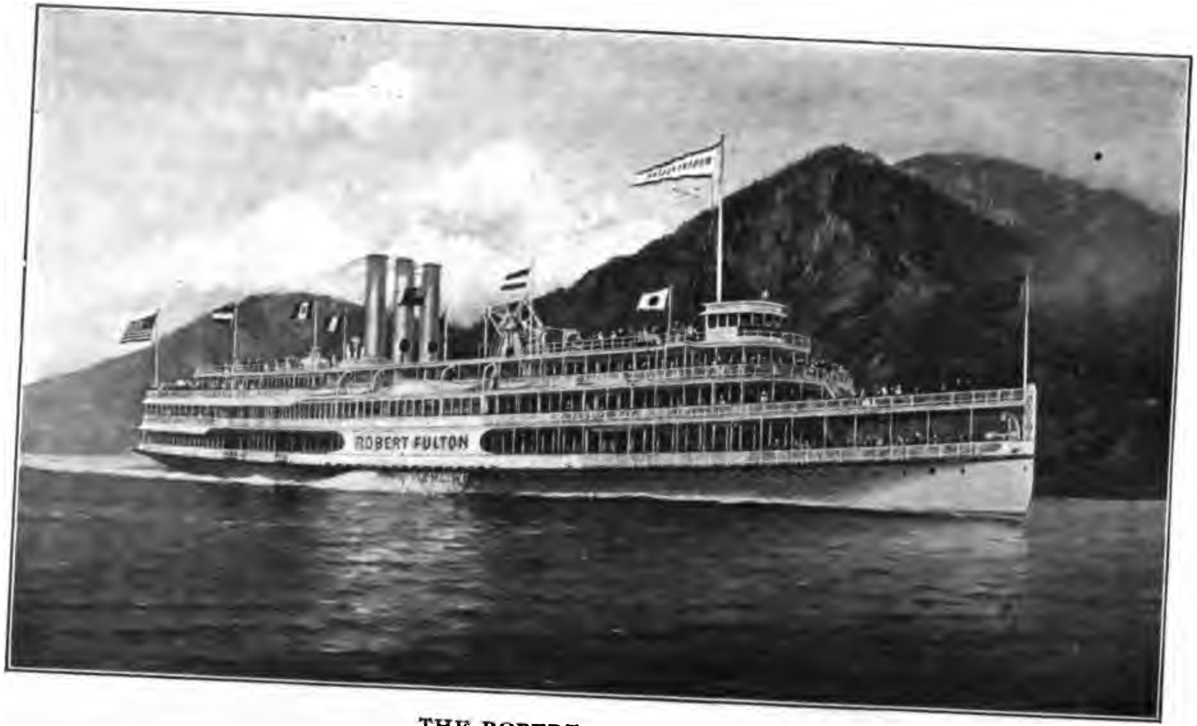
That put a stop to racing, and from this time forward the steamboat companies directed their energies to the improvement of their boats and comfort of their passengers, and resulted in the early fifties in a fleet of boats which were recognized at that time as "floating palaces." Among the first of these was the steamboat Oregon, built in 1846. Rear Admiral Preble, U. S. N., in his History of Steam Navigation says:

"The Hudson River steamer 'Oregon,' the most magnificent steamer afloat in 1846, it is said, maintained a speed against a west-northwest gale and head sea of twenty miles an hour. In calm weather she made an average speed of *twenty-five miles an hour*. Her length was 330 feet by 35 feet width of beam and her measurement one thousand tons. Her engine was eleven hundred horse power, and had a seventy-two inch cylinder with eleven feet stroke. The massive engine in the centre, and four or five side parlors fitted up with ten or twelve berths to each, opened out over the guards, as also a smoking room, denominated the 'Exchange,' and the wash-room and barber's shop—the latter fitted up with marble slab, Croton water, wash bowls, etc. A portion of the after cabin was set aside for ladies. The dining saloon accommodated two hundred and fifty persons. The state-room hall on the upper deck was 220 feet long by 16 feet wide. Out of it opened sixty state rooms furnished in sumptuous style. The cost of the furniture and fittings was thirty thousand dollars, and the boat itself about one hundred and thirty thousand dollars. She was built under the superintendence of her commander, Capt. St. John; and her symmetry, the beauty of her model and the arrangement of her engines, which gave her unrivalled speed were the result of his long and practical experience."

Thus at the end of the first half century of steam navigation the prophecy of John Fitch had been fulfilled, that "all our great lakes, rivers and oceans would be navigated by vessels propelled by steam."

The half century since has developed new styles of steamboat construction with modern equipments for the accommodation of passengers equal to the finest hotels in the world. Among the latest of these is the second Hendrick Hudson and the Robert Fulton. Of the latter the New York *World* says:

"The Robert Fulton, which, built in honor of the Hudson-Fulton celebration this fall, [1908], was finished in record time, two months and ten days after the keel was laid. She is 346 feet in length, 76 feet in breadth over guards molded. Her hull is 42 feet in breadth, and her displacement only 12 feet. She was designed by Frank E. Kirby to meet the problem of carrying only passengers and no cargo as ballast. She is more luxuriously furnished than any other boat on the Hudson. She has private parlors with separate deck room. She will convey between 4,000 and 5,000 passengers and is thoroughly fireproof. Everything below the main deck is of steel. The kitchen is built in separate compartments of steel, so that it could catch fore and not affect the remainder of the boat. The engine room and the boiler room are similarly encased. Asbestolith is generously used on the upper decks, and as a result there is the least amount of inflammable material possible on the boat."



THE ROBERT FULTON. 1908-9.

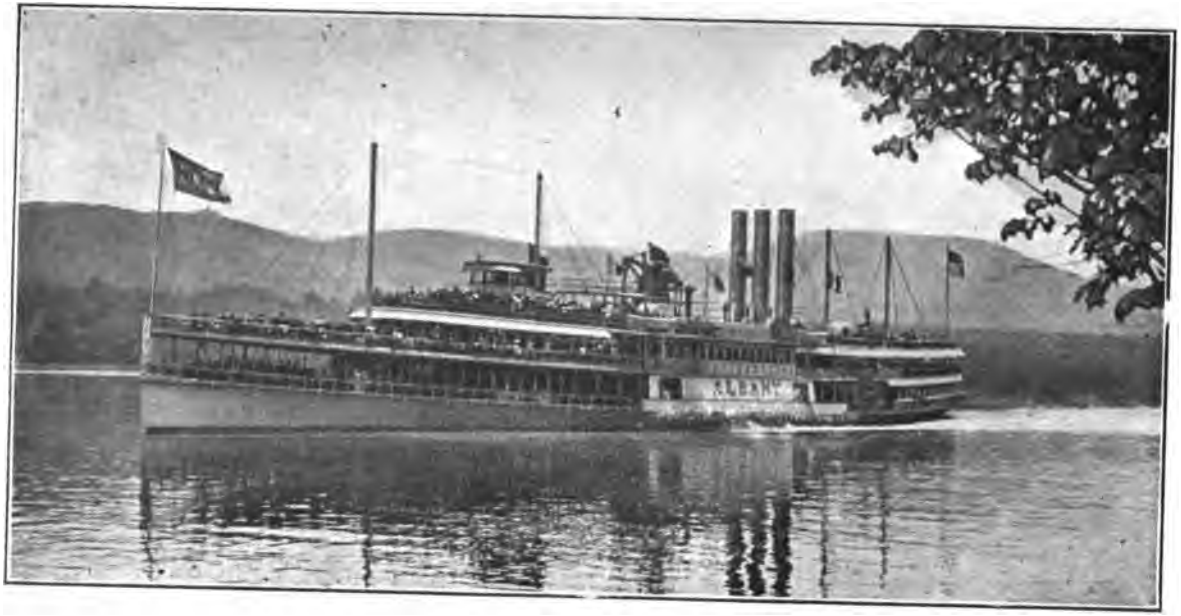
HUDSON RIVER DAY LINE

The Hudson River Day Line of Steamers was established in 1822, and by reference to page 67 it will be seen that the first boat to make regular trips from New York to Albany by *daylight* was the ***Richmond*** (misprinted Redmond), one of the early boats built for the Fulton Line (1812). She was announced to start June 22 at 6 o'clock A. M., on Monday and Friday; the Chancellor Livingston and Fire Fly left on alternate days at 4 o'clock P. M. The *Sun,* in 1827 was the first boat that ever made the trip from sun to sun; and the New Philadelphia was announced the same year to leave New York Tuesday, Thursday and Saturday at 6 A. M., and Albany Wednesday, Friday and Sunday at the same hour. On June 10, 1831 the "New Philadelphia" ran from New York to Albany in nine hours and forty-five minutes, including stoppages. Many changes and constant improvements have been made in the past three-quarters of a century, and it would seem as if in this centennial year the acme of steamboat construction and steamboat navigation had been reached by the present Hudson River Day Line. The steamboat Robert Fulton has been briefiy described on pages 80-81.

VIEW OF THE HENDRICK HUDSON

The hull of "Hendrick Hudson" was built at Newburgh by the Marvel Ship Building Company, under contract with the W. & A. Fletcher Company of New York, who built her engines, and under designs from Frank E. Kirby. Her principal dimensions are: Length, 400 feet; breadth over all, 82 feet; depth of hold, 14 feet 5 inches, and a draft of 7 feet 6 inches. Her propelling machinery is what is known as the 3-cylinder compound, direct acting engine, and her power (6,000 horse) is applied through side wheels with feathering buckets, and steam is supplied from eight boilers. Steel has been used in her construction to such an extent that her hull, her bulk-heads (7 in all), her engine and boiler enclosures, her kitchen and ventilators, her stanchions, girders, and deck beams, and in fact the whole essential frame work of the boat is like a great steel building. She is licensed to carry 5,500 people. She made on her trial trip over twenty-three miles an hour. Her mural paintings represent prominent features of the Hudson, and her decorations throughout are the finest that art and human ingenuity could possibly devise.

HENDRICK HUDSON



ALBANY

The Albany

The favorite steamer Albany is one of the finest of vessels afloat, possessing every modern improvement in steamboat construction with a carrying capacity of 4,000, but for the sake of comfort the license applied for, limited the number to 3,000. On her trial trip she ran 75 miles in three hours and seven minutes.

The business affairs of the company are conducted by men of large experience and well known capacity. Mr. E. E. Olcott is the president and general manager.

THE PEOPLE'S LINE

It is just three-quarters of a century since the People's Line was established, and great changes have taken place during that period. The Troy line was established in 1832 with the steamers Champlain and Erie, and the following year the North River Line, the Hudson River Line, and the Troy Line consolidated and formed the Hudson River Association Line. This company ran both a day and night line, with the steamers Albany, Champlain. Erie and Novelty as day boats, and the North America, Clinton and Ohio as night boats.

The People's Line was established in 1834 as a day line in opposition to the Hudson River Association. Cornelius Vanderbilt was largely interested in this venture. The first boat on the line was the West Chester, and a year later the Nimrod and Champlain was added.

In June, 1835 the People's Line was sold to the Hudson River Association for $100,000, and ten thousand yearly for ten years. But in 1838 the People's Line was revived as a night line by Daniel Drew, who purchased the West Chester and "Emerald;" the "Rochester," built by this company was added the same year, and in 1839 the "Utica." In 1834 they built the "Knickerbocker," and the next year the "Henry Hudson;" in 1846 the "Isaac Newton;" in 1864 the "St. John;" in 1866 the "Dean Richmond," and in 1867 the Daniel Drew.

A day line of steamers was started by John McBride Davidson in 1864, who bought the "Drew" and "Armenia." in 1866 the Chauncey Vibbard was added, and in 1881 the "Albany." The Drew was named in honor of the famous financier Daniel Drew, who became connected with the company in 1846, and was for some time its president. In 1886 the line consisted of the Daniel Drew, Albany and Dean Richmond. At the time the Drew made her appearance it was stated that "this majestic steamer is about 400 feet long; width of hull, 48 feet; width over guard, 84 feet; depth of hold, 10 feet; draft, 6 feet. She is propelled by an engine of 82 inch cylinder, 15 feet stroke, carrying from 20 to to 26 pounds of steam. She is 2,500 tons burden and has sleeping accommodations for 1,000 passengers." She was called a "floating palace;" but forty years experience has produced great changes; steel has taken the place of wood, and the interior decorations are princely, as appears in the description of the present boats.

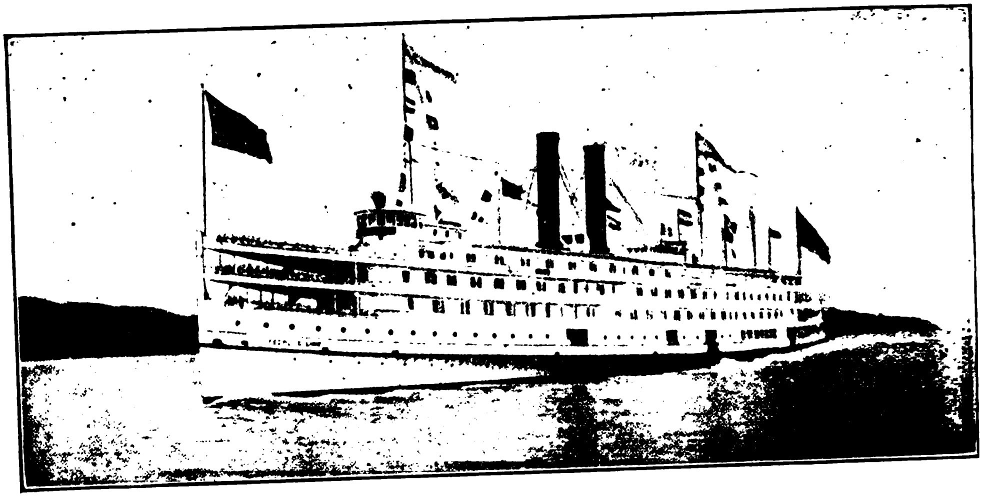
The "Adirondack" and the "C. W. Morse" are indeed "floating palaces;" and tourists from abroad who have traveled the world over are lost in wonder and astonishment at the immense proportions and magnificent equipment.

The C. W. Morse made her trial trip on May 26, 1904, with a large number of invited guests, and the next day she was placed in commission. In the souvenir issued by the People's Line for the centennial year of steam navigation, it is stated that:

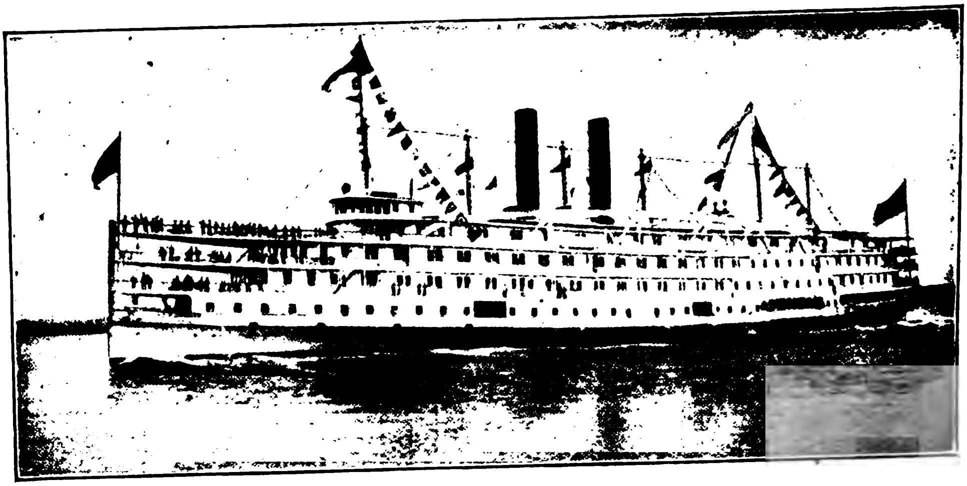
"In general contour and in grace of outline these sister steamers—the "Adirondack" and the "Morse"—strike the observer as being much alike. The "Morse" is, however, considerably the larger, and has, in point of fact, accommodations for more passengers than any steamer plying the American coast or inland waters; there being no less than 450 state rooms, exclusive of those used by the officers. She has a length over all of 427 feet. . . . She has a breadth of 90 feet, nearly three times that of the "Chancellor Livingston," the last and greatest of Fulton's boats built in 1816. The "window seats" enable the traveler to sit at his ease and view the magnificent scenery and places of interest along the banks of the Hudson. The great search light, with its 36 inche lens, penetrates every nook and corner of the river bank, giving one a peculiar sensation, that borders on the miraculous, turning night into day.

Neither pains nor expense have been spared to provide for the comfort of the traveling public. The "Morse" is provided with every known equipment for the kitchen, and is equal to those of our best metropolitan hotels. "Every known appliance from the great sixteen-foot range and immense boilers, to the automatic egg-cooking device has been installed."

The interior arrangements of the "Morse" are thus described: "As the passenger ascends the broad stairway from the lower lobby, adjoining which are located the purser's office, barber shop, parcel room, he finds himself in the grand saloon, running the entire length of the enclosed portion of the steamer. It is here that he gets his first impression of the enormous size of the 'Morse.' Two galleries, with their mahogany guard rails



C. W MORSE



ADIRONDACK

and green bronze grill work, enclose the saloon, and from them, as from the main floor, open the staterooms, so cleverly arranged that there are few inside rooms, and none, in fact, which are not freely ventilated from the outside.

"The color scheme of the main saloon is white and green, and it has been so beautifully executed that the effect is wonderfully pleasing and restful, with none of the over-decoration and garishness so often found on steamers. There are a number of cabins de luxe, whose walls are hung in silk and cotton of pleasing pinks, blues or greens, with ceilings in ivory and gold. These sumptuous apartments are furnished with double brass beds, and have private bath and toilet adjoining, and are so arranged that they may be taken singly or in suite, furnishing the acme of traveling comfort. There are also on each deck bath rooms for the use of passengers occupying state rooms without baths attached, a feature which is an entire novelty on river steamers. The decks of the 'C. W. Morse' are enormous in height, and of unusual breadth, and the upper deck permits of an unobstructed promenade around the entire steamer. Aft upon this deck is the large palm garden and the cafe.

"Structurally, the 'Morse' is a model of marine construction of the highest type. Many water-tight bulkheads are properly placed to insure the safety of the steamer and her passengers in case of accident. The deck-houses on the freight-space are enclosed in steel up to the saloon deck, and the entire motive power of vessel is thoroughly enclosed in steel, where possibility of fire exists.

"The electric plant has a maximum capacity of 3,000 sixteen candle power lamps, and consists of three multopolar direct-coupled compound wound dynamos, driven by vertical engines of the General Electric Company's make. The electric engines are so connected that they may work either low or high pressure, as desired. Every precaution has been taken to have the electric wiring of the very highest class, and perfectly fire and water-proof, the entire feeders and circuits being incased in iron conduits, not over eight lights on any one circuit. The searchlight is the largest made. It is without question one of the most thoroughly equipped marine plants in existence.

"The vessel is equipped with electric bells, thermostatic push buttons, fire alarms, automatic whistle, watchman's clocks, telephones for special service, and where auxiliaries are not run by steam, electric motors are now used.

Two complete and separate systems of steering gear are used —steam and hand. The company has omitted nothing in her construction or equipment which makes for safety, comfort or convenience, and no detail of luxury has been slighted. Most of the details of construction and equipment described in the 'Morse' will be found in the other boats of this company."

The officers of the company are men of large experience and known business capacity. These are: John Englis, president; Andrew Fletcher, Jr., vice-president; N. H. Campbell, secretary and treasurer; A. C. Sprague, auditor; J. H. Allaire, general passenger agent; Frank C. Earle, general freight agent; Wm. J. Carroll, purchasing agent; H. McConvell, general baggage agent; E. C. Shaffer, general agent, Albany; J. C. Morris, traveling freight agent, Saratoga; Robert Farrell, traveling advertising agent.

HISTORY OF THE FALL RIVER LINE AND THE NAVIGATION OF LONG ISLAND SOUND

The name of Fulton is associated with the history of steam navigation on Long Island Sound as well as on the Hudson, and Fulton kept this object constantly in view, while experimenting in inland waters. The first boat constructed by him for the express purpose of navigating Long Island Sound was the "Fulton," the twelfth steamboat constructed under his supervision up to 1815. It was considered at the time a hazardous undertaking for Hell Gate—fitly named—(from the Dutch Hellig," angry, and "Gat," a gate) stood in the way, waiting to swallow up any daring navigator who should attempt to pass through her portals by any other means than those provided by nature. There were

"Spirits above and spirits below;
No spirits of joy, but spirits of woe."

This passage, previously to its being navigated by the "Fulton," was always supposed to be impossible, except at certain stages of the tide, and many a shipwreck has been occasioned by a small mistake in the time. It was a critical period in Fulton's career, for previous to this the only elements he had to contend with were wind and tide, and these obstacles he had already overcome.

The New York *Evening Post* of June 4, 1814, had the following announcement:

"The public are respectfully informed that the subscriber has commenced running the steam boat 'Fulton' between the cities of New York and Albany, for the accommodation of passengers.

"This boat was built for the purpose of plying between New

York and New Haven, but will probably be employed on the Hudson until a cessation of hostilities (the War of 1812-15) enables the proprietor to put her on her destined route. The complement of passengers is limited to 60, and the price of passage therefore necessarily raised to 10 dollars."

The same paper in its issue of March 25, 1815, stated that "The steamboat 'Fulton' commenced her trip from New York to New Haven on Tuesday last, a little after 5 in the morning, and arrived at New Haven at half-past four in the afternoon, having completed her passage in a little more than 11 hours.

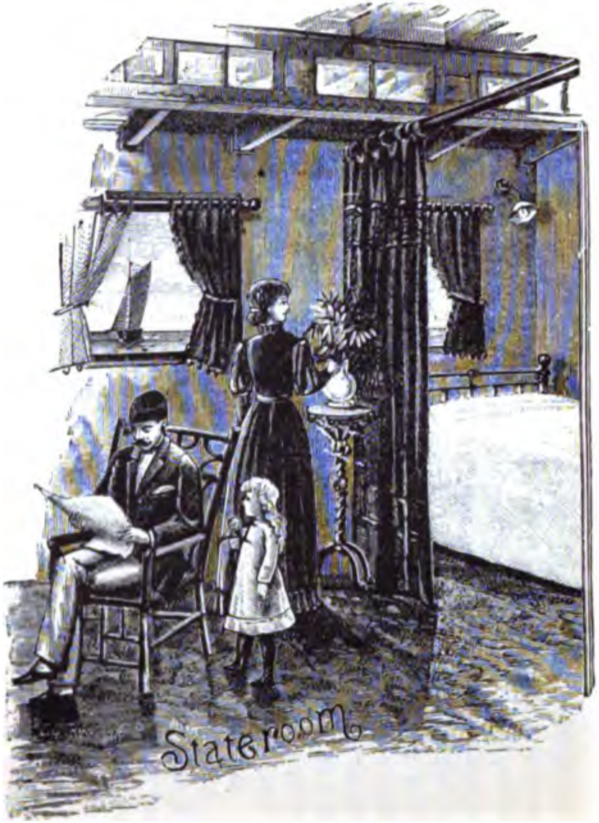
"On her return trip on Friday the wind blew a gale from the south which was directly ahead and raised a very rough sea, but the boat, notwithstanding the disadvantages which have been enumerated, and under which she continued to labor, encountered it without the least difficulty. The facility with which she passed Hell Gate in both instances, surprised everybody who was on board, and satisfied them that no vessel can be well calculated to navigate this dangerous channel as the steam boat. She will probably never again have to encounter so many disadvantages.

"We have been assured that this establishment cost $90,000, and we believe it may with truth be affirmed that there is not in the whole world such accommodations afloat as the 'Fulton' affords. Indeed it is hardly possible to conceive that anything of the kind can exceed her in elegance and convenience."

The Fulton was sloop-rigged, one mast, and depended on her sails to accelerate her speed. She was 134 feet long, 26 feet beam, with rails along her side, and measured about 30 feet outside her guards; her wheel was about six feet stroke. She carried on her bow a figure head of Fulton. This was the beginning of steam navigation on the Hudson. There were many interruptions and changes during the next few years. On the 12th of July, 1822, the Rhode Island Steamboat Company was organized, and the steamers "Connecticut" and "Fulton" began making regular trips between Providence and New York, touching at Newport each way. The fare between Providence and New York was $10, and between Newport and New York $9. The first of the more modern built steamers was the "Massachusetts" and "Rhode Island," both completed in 1836. The business between New York and the east continued to increase, and active competition was the result. Fortunes were sunk (none ever made) in these great steamboat enterprises, the details of which would be of little interest to the general reader. (See page 60 for further particulars).

Out of chaos and confusion, and wrecked hopes and expec-

Café



Stateroom

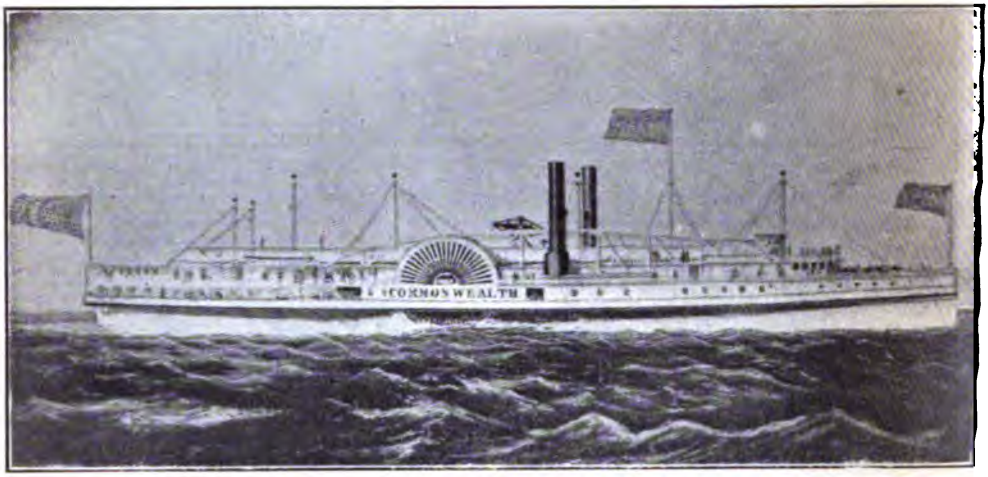
tations, the Fall River Line was organized in 1859, and from that time down to the present PROGRESS has marked every venture in steamboat construction. Millions have been spent in improvements and each new steamer has exceeded the previous one. The first of the iron boats was the "Pilgrim" in 1883, followed by the "Puritan" in 1889, called "The Queen of Long Island Sound." The greatest improvement that impresses the traveler is the interior arrangements, and the first of these is the state room. Here a man can enjoy all the comforts of home with his family around him, and have that perfect privacy which he is often denied in public conveyances. From the open windows he can enjoy the cool breezes and view the magnificent scenery as he passes. The luxuries of steamboat travel in the last few years have increased an hundred fold. The old "tallow dip" has given place to the beautiful electric lights, and a man can enjoy his bath with all the comfort and conveniences of his own home. Freed from the cares of business his happiness for the time is unalloyed, and he can retire for rest, awakening only at the place of his destination.

To enumerate all the luxuries of the present steamboat, which human ingenuity has devised, would fill a volume, but the cost of travel is so trifling in comparison to the benefit to be derived in these floating palaces, that they can be enjoyed by persons of very ordinary means.

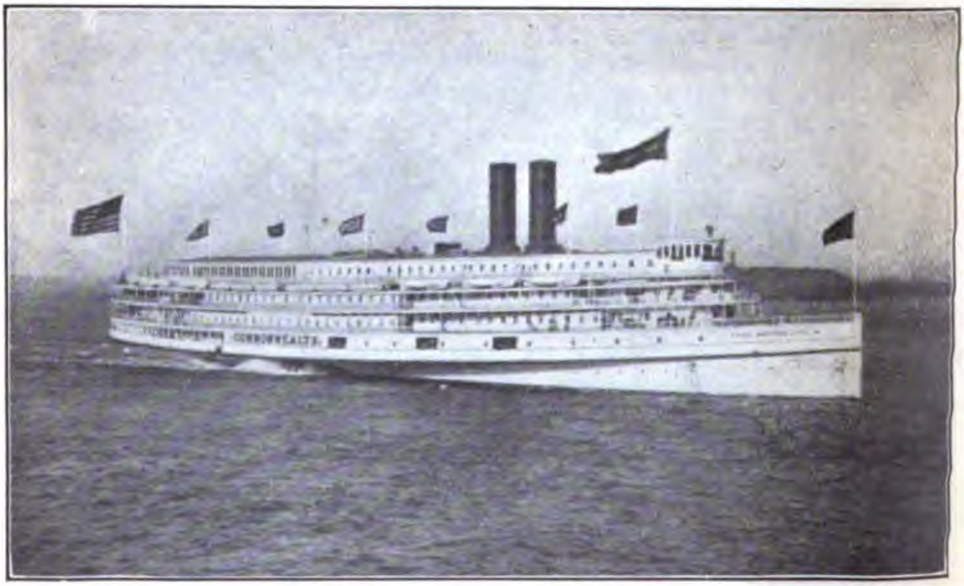
Next in importance is the cafe, in striking contrast to the facilities afforded in former times when the long dining table stretched from one end of the cabin to the other, and immediately on the ringing of the bell every one rushed for a seat, while some unfortunates who were left had to take their turn.

The modern cafe does away with all these inconveniences of travel and a man may "sit under his own vine and fig tree," figuratively, and enjoy the exclusive society of his own family, or invite a friend to sit with him if he chooses. He can economize according to the size of his purse or he can indulge himself with the choicest of viands and the "very latest the market affords." He can select his own society and consult his own tastes and live like a prince in a most democratic manner.

The latest addition to the Fall River Line is the "Commonwealth," of which it is said "no vessel heretofore built for service on inland waters is so large, so magnificent, or has so many comforts and conveniences" as this modern structure, the cost of which would lay out and build a modern town, and if Robert Fulton were living he would find the acme of all his hopes and expectations and the fulfilment of his dreams that, "The Liberty of the Sea will be the Happiness of the Earth."



COMMONWEALTH, 1855



THE NEW COMMONWEALTH, 1908

"This beautiful craft best typifies the art of boat building; for indeed it is an art as it stands to-day. Her dimensions are: Length over all, 456 feet; breadth of hull, moulded, 55 feet; breadth over guards, 96 feet; depth of hull, 22 feet. For artistic beauty the interior of the Commonwealth may be judged by the standard of the most palatial residence. The quarter-deck, as one enters, corresponds to the lobby in a theatre. Surmounting the supporting columns are grotesquely carved mariner's heads, forming a corbel. Around the lobby is a high wainscoting enriched with marquetry panels showing female figures, symbolizing Navigation and Commerce.

Abaft the lobby is the library. Its decoration is of the period of Louis XVI. The trim is in old ivory; the mouldings and cornice are embellished with gold. The book cases and chairs are of mahogany.

From the quarter-deck an imposing stair case leads to the saloon deck, showing a beautifully decorated saloon of the period of Louis XV. The ceiling is paneled with carved ornamentations on each panel; the carpets, furniture and upholstery are in harmony with the decorative period.

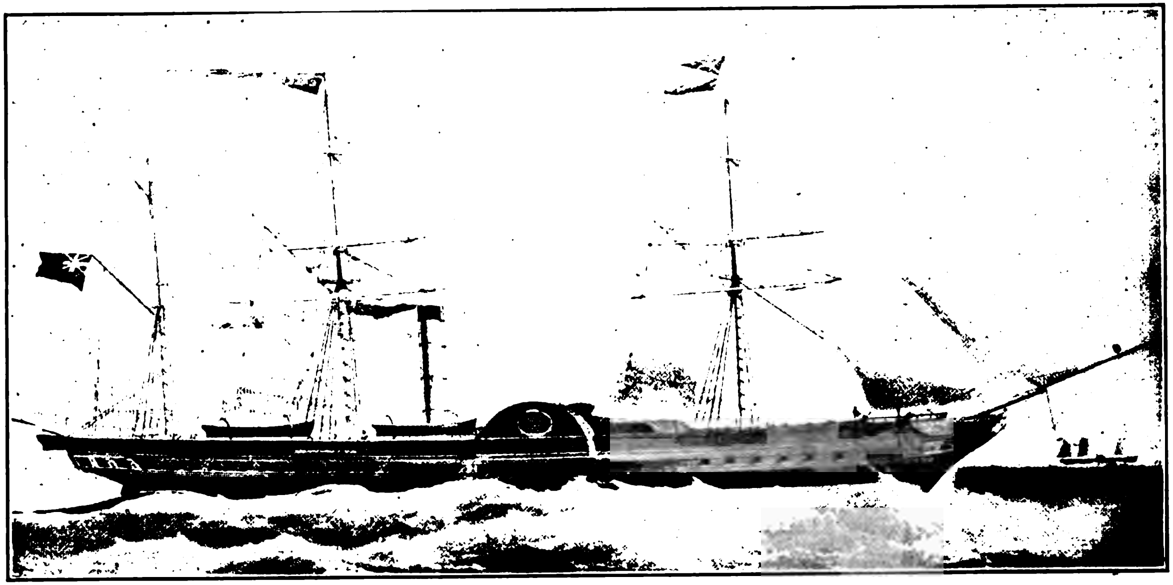
The second gallery deck of the steamer forms a balcony around the saloon. There is also a mezzanine gallery where the orchestra holds forth, and these free entertainments are almost continuous up to the hour of retiring. Over the musician's gallery is an allegorical painting typifying the commonwealth. Government, Industry and Commerce are represented by three female figures.

Writing desks provided for the use of the passengers have glass tops and softly shaded reading lamps. The writing paper bears the "Commonwealth's" crest, combined with the coat armor of the states of New York, Connecticut, Rhode Island and Massachusetts forming the elements of the shield. Every part of the boat where passengers congregate is furnished with the most complete and artistic arrangements that can be devised.

Like all steamers of the Fall River Line the "Commonwealth' is built of steel. Seven bulkheads extend to the main deck. She has a double hull and the space between the bottom is divided into a number of water-tight compartments. The safety of the steamer is thus assured in case of accident. For further protection there are collision bulkheads at each side of the steamer, at the guards and bulkhead athwartship.

For safeguarding the steamer and her passengers every precaution that experience and foresight can suggest has been utilized by the builders of the "Commonwealth." She carries a life saving crew and has one-third more life-preservers, liferafts and buoys than are required by the United States Government regulations.

The "Commonwealth" is capable of maintaining a speed of twenty miles an hour. Her engine is of the double-inclined, compound type, with two high-pressure cylinders, ninety-six inches in diameter, all having a common stroke of piston of nine feet six inches.



THE FIRST CUNARDER, BRITANNIA, 1840

PART II

RAILROAD TRANSPORTATION

CHAPTER I

EARLY EXPERIMENTS IN LOCOMOTIVES AND RAILROADS. OLIVER EVANS AND HIS "ERUCTOR AMPHIBOLIS." BENJAMIN DEARBORN'S PATENT FOR STEAM CARRIAGE 1819. STEAM CARRIAGE IN KENTUCKY 1819. "THE WALKING HORSE" 1822. THE MOHAWK AND HUDSON RAILROAD CO. THE FIRST LOCOMOTIVE IN AMERICA—THE "STOURBRIDGE LION."

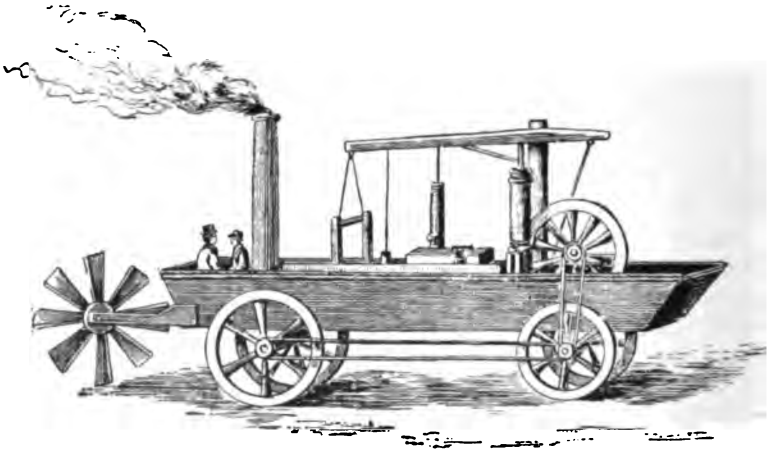
Experiments in land transportation by the use of steam carriages began almost as early in this country as that of steamboats for water navigation: claimants for the discovery of the former, however, are not as numerous as those of the latter. Oliver Evans, a native of Delaware, was among the first, if not *the first,* to demonstrate the practicability of steam as a motive power for land transportation; and at the same time he was conducting his experiments in steamboat navigation. His experiments, like those of Fitch, were conducted under serious difficulties and great discouragements. At the age of fourteen he was apprenticed to a wheelwright or wagon maker. His master, an illiterate man, observing his apprentice employing his leisure evenings in study, through motives of parsimony, forbade him using candles, but the lad, in no way discouraged, collected at the close of each day, the shavings made from his work, and by their feeble light in a chimney corner, he pursued his evening studies, and his knowledge thus obtained enabled him to pursue his subsequent experiments with greater intelligence. His discovery of steam as a motive power was due to a trifling incident that occurred during his apprenticeship. A neighboring blacksmith's boy, for amusement, had stopped up the touch-hole of a gun barrel; then pouring in a gill of water, rammed down a tight wad; after which, on putting the breech in the fire it discharged itself in a report like that of gun powder. Evans's active mind instantly saw that *here* was the long desired power, if he could only apply it, and from this period he sought to discover the means. He labored for some time without success; at length a book fell into his hands, describing the old atmospheric steam engine; and he was greatly astonished to observe that they had so far erred as to the use of steam only in forming a vacuum to apply the mere pressure of the atmosphere,

OLIVER EVANS.

instead of using the elastic force of the steam for the original motion, the power of which he supposed irresistible. He therefore renewed his studies with increased ardor, and soon declared that he could make steam carriages. This must have been in the early seventies before the Revolution, as he was born about 1756. Evans endeavored at this time to communicate his idea to others, but was held up to ridicule. He never abandoned the idea, however, and some time later began his experiments in flour mills, making many improvements, though receiving but little encouragement. In the year 1786 he petitioned the Legislature of Pennsylvania for the exclusive right to use his improvements in flour mills and steam carriages in that State, and in the year following a similar petition to the Legislature of Maryland. His representations concerning steam carriages were considered as savoring too much of insanity to deserve notice; but in Maryland, although the steam project was laughed at, yet one of his friends, a member, judiciously observed that the grant could injure no one, and therefore wished the encouragement might be afforded as there was a prospect that it would produce something useful. This kind of argument had its effect, and Evans received all that he asked for, and from that period considered himself bound in honor to the State of Maryland to produce a steam carriage as soon as his means would allow him, but he little realized the difficulties he would have to encounter to convince others of the utility of his invention.

For several years he endeavored to interest some person of pecuniary means to assist him in carrying out his plans. It was not until 1800 or 1801 that Evans, having given up all hope of securing assistance from others, determined to construct a steam carriage at his own expense. Previous to commencing operations, however, he explained his views to Robert Patterson, professor of mathematics in the University of Pennsylvania, and also to an eminent English engineer. They both declared the principles new to them, and advised the plan as highly worthy of a fair experiment. As a result he constructed his "ERUCTOR AMPHIBOLIS." Some persons ridiculed this experiment of driving so great a weight on land because the motion was too slow to be useful. The inventor silenced them by offering to construct a carriage propelled by steam for a wager of three thousand dollars to run upon a level road against the swiftest horse that could be produced. This machine is believed to have been the first application of steam power to the propelling of land carriages.

In the American edition of "Wood's Treatise on Railroads," he says: "It is scarcely necessary to mention to the American



OLIVER EVANS'S STEAMBOAT AND WAGON
Eructor Amphibolis, 1804

reader that the claims respecting the high pressure steam and locomotive engines to which the English assert, is entirely without foundation. The application of steam in this manner and to these purposes had, indeed, been contemplated, but never reduced to practice until the experiments alluded to. In early life Mr. Evans sent Mr. Joseph Sampson to England with the drawings and specifications of his steam engine, etc. They were exhibited to numerous engineers, and his plans were copied by Messrs. Vivian and Trevithick without any acknowledgment; the latter persons acquired fame and fortune, while the ingenious, but eccentric Evans, died poor, neglected, and broken-hearted. AMERICA MAY THEREFORE CLAIM THE INVENTION OF LOCOMOTIVE ENGINES with even more justice than that of steamboats,—inventions which are destined to revolutionize the commerce and defence of nations."

On the 25th of September, 1804, Evans submitted to the consideration of the Lancaster turnpike company a statement of the costs and profits of a steam carriage to carry one hundred barrels of flour, fifty miles in twenty-four hours; tending to show that one such steam carriage would make more net profits than ten wagons, drawn by five horses each, on a good turnpike road, and offering to build one at a very low price. His address closed as follows: "It is too much for an individual to put in operation every improvement which he may invent. I have no doubt but that my engines will propel boats against the current of the Mississippi, and wagons on turnpike roads with great profit. I now call upon all those whose interest it is, to carry this invention into effect. All of which is respectfully submitted to your consideration." Little or no attention was paid to the offer.

It was during this same year—1804—that Evans, by order of the Board of Health of Philadelphia, constructed at his works, situated a mile and a half from the water, a machine for cleaning docks. It consisted of a large flat, or scow, with a steam engine of five horse power, to work machinery in raising the mud into scows. This afforded him a fine opportunity to show the public that his engine could propel both land and water conveyances. When the machine was finished, he fixed, in a rough and temporary manner, wheels with wooden axletrees. Although the entire weight was equal to two hundred barrels of flour, yet his small engine propelled it up Market street and round the circle to the water-works, where it was launched into the Schuylkill. A paddlewheel was then applied to its stern, and it thus sailed down that river to the Delaware, a distance of sixteen miles, leaving all vessels that were under sail at least half way, (the wind being ahead) in the presence of thousands of spectators, which he supposed would have convinced them of the practicability of steamboats and steam carriages. But no allowance was made by the public for the disproportion of the engine to its load, nor for the rough manner in which the machinery was fixed, or the great friction and ill form of the boat, but it was supposed that this was the utmost it could perform.

After a lapse of years, as the improvements in the manufacture of flour came into popular use, the inducements to infringe upon Evans's rights increased, until he was obliged to appeal for redress to the United States Circuit Court of Pennsylvania, but through some informality in the patent, an unfavorable decision was rendered. Thus he was deprived of all means of recovering what was so justly due. He then, by advice of his counsel, petitioned Congress for a new patent. In stating his case, he observed, "that he had been at great expense in publishing and disseminating these inventions, travelling either by himself or agents for thirteen years, throughout the country, from state to state, and from mill to mill, to instruct workmen in their manufacture, and millers in their use; and in this way had expended the small fees which were received from those who had generously and freely paid for their license." These arguments were so clearly founded on justice that the Government could not but listen to his claims, and the petition was granted January 21, 1808. In the litigation that followed by contending parties who had been infringing on his patents Evans's claims were fully sustained, but too late to be of any great pecuniary benefit to him. He died April 21, 1819.

A few years subsequent to his marriage, Mr. Evans removed to Philadelphia where he finally established an iron foundry and steam factory. Here he prepared his two works for the press, viz., the "Young Millwright's and the Young Steam Engineer's Guides,"—productions every way worthy of their author. In 1810, his two sons-in-law, Messrs. James Rush and David Muhlenburg, joined and continued in business with him until the time of his decease.

BENJAMIN DEARBORN'S APPLICATION FOR A PATENT STEAM CARRIAGE 1819

A paper called *The Villager,* published in 1819, a copy of a memorial presented to Congress at the previous session, which was referred to the Committee on Commerce and Manufactures.

"The memorial of Benjamin Dearborn of Boston, respectfully represents that he has devised in theory a mode of propelling wheel-carriages in a manner probably unknown in any country; and has perfectly satisfied his own mind of the practicability of conveying mails and passengers with such celerity as has never before been accomplished, and with complete security from robberies on the highway.

"For obtaining these results he relies on carriages propelled by steam on level railroads, and contemplates that they be furnished with accommodations for passengers to take their meals and their rest during the passage, as in packets; that they be sufficiently high for persons to walk in without stooping, and so capacious as to accommodate twenty, thirty, or more passengers, with their baggage.

"The inequalites of the earth's surface will require levels of various elevations in the railroads, and your memoralist has devised means which he believes will be completely effectual for lifting the carriage, by the inherent power of its machinery, from one level to another, as also for the passage of carriages by each other, on the same road; and he feels confident that whenever such an establishment shall be advanced to its most improved state, the carriages will move with a rapidity at least equal to a mile in three minutes.

"Protection from the attacks of assailants will be assured; not only by the celerity of the movement, but by weapons of defence belonging to the carriage, and always kept ready in it to be wielded by the number of passengers constantly travelling in this spacious vehicle, where they would have liberty to stand erect, and to exercise their arms in their own defence.

"The practicability of running steam-carriages on the common road was long since advocated in a publication, by that ingenious and useful citizen, Oliver Evans: your memoralist, therefore, does not assume the merit of originating the idea of steam-carriages, but only of modifying the system in such a manner as to produce the results here stated, which could not be effected on a common road.

"Relying upon the candor of the national council, this memorial is laid before them with the desire that ingenious and scientific artists, in the different sections of our country may be consulted by direction of Congress, on the probability of accomplishing the purposes here anticipated; and that an experiment be made, if sanctioned by their favorable opinions; for if the design can be put into successful operation by the Government, a great revenue would eventually be derived from the establishment, besides the advantages before enumerated."

A Steam Carriage in 1819

The following account of a steam carriage is found in Niles Register in its issue of September 11, 1819:

"A London paper of July 17, says:—The Americans have applied the power of steam to supersede that of horses in propelling stage coaches. In the State of Kentucky a stage coach is now established with a steam engine which travels at the rate of twelve miles an hour; it can be stopped instantly, and set again in motion with its former velocity, and is so constructed that the passengers set within two feet of the ground. The velocity depends on the size of the wheels."

Niles Register, in its issue of September 6, 1822, copied the following account:

"The Walking Horse. *The Leeds Mercury* gives the following account of the application of steam power for propelling land carriages. It is many years since this power was applied for such purposes in the United States, and we wish that the fact should be remembered. The idea suggested itself to the late Oliver Evans in 1772, and was admirably put into operation in the year 1804, at Philadelphia.

"The engine which carries coal from the Orvill pits draws twenty wagons, each containing upwards of a ton. The people in the neighborhood emphatically call it the '*walking horse*', and certainly from the description of a friend it bears no little resemblance to a living animal. The engine being on the high pressure principle, the superabundant steam is emitted at each stroke with a noise something similar to the hard breathing of a snorting horse—the escaping steam representing the breath of his nostrils; and the description is altogether aided by the regular motion of the engine beam, and the rapidity of motion which precludes minute observation. In the ascent the rate is about four miles an hour, and on a level ground from four to six.

"On Wednesday last a highly interesting experiment was made by a machine constructed by Messrs. Fenton, Murray & Wood, of this place, under the direction of John Blenkensop, the patentee, for the purpose of substituting the agency of steam for the use of horse power, which, with the assistance of cranks turning a cog wheel, and iron cogs placed at one side of the railway, is capable of moving, when highly loaded, at the speed of ten miles an hour. At four o'clock in the afternoon the machine ran from the coal staith to the top of Hunslet-moor, where six and afterwards eight wagons of coal, each weighing 3 1-2 tons, were hooked to the back part. With this immense weight, in which, as it approached the town, was superadded about 50 of the spectators mounted upon the wagons; it set off on its return to the coal staith, and performed the journey, a distance of about a mile and a half, principally at dead level, in twenty-three minutes without the slightest accident. The experiment which was witnessed by thousands of spectators, was crowned with complete success; and when it is considered that this invention is applicable to all railroads, and that upon the works of Mr. Branding alone the use of 50 horses will be dispensed with, and the corn necessary for the consumption of at least two hundred men saved, we cannot forbear to treat the invention as of vast public ultility, and to rank the inventor amongst the great inventors of his country."

A correspondent of a Providence, Rhode Island, paper, who claimed to be the inventor of the cheapest railroads yet devised, thus describes the merits of his invention: "Only one English engine *alone* costs $2,000, which sum the whole of our apparatus does not much exceed, as figures will prove; for 700 good chestnut rails at $3 amounts to only $21; and it ought to be remembered that this is *all* the expense we are at, and the inference is conclusive in our favor. We place our rails fifty to the mile, by the side of the road to pry out the wheels when they get stuck, and hoist behind when wanted."

The *American Mechanics Magazine* for 1825, devoted considerable space to the discussion of railroad affairs, which at that time was the subject of much controversy both in England and America. Under date of April 30, 1825, it says: "The intention of the present scheme is to introduce a more economical and expeditious mode of conveyance than is now in use for vehicles of every kind, whether employed in the transportation of persons or merchandise. It is proposed to supersede entirely the necessity of horse-power in all public wagons, stages and mail coaches, post chaises, etc., and to employ in its stead the more potent agency of steam. A careful examination of the drawings now presented to the public as a plan of general iron railway, will, it is hoped, clearly demonstrate the ease, safety and celerity with which vehicles of every denomination for the conveyance of goods and persons may be propelled by mechanical power." In the same issue it says: "The value of railroads as a medium of commercial communication, has not escaped the sagacity of Dr. Young. In his lecture on natural philosophy, he says: "It is possible that roads paved with iron may hereafter be employed for the purpose of expeditious travelling, since there is scarcely any resistance to be overcome, except that of the air;

and such roads will allow the velocity to be increased almost without limit.

"Iron railways are of two descriptions. The flat rail, or tram road consists of cast iron plates about three feet long, four inches broad, and half an inch or one inch thick, with a flaunch or turned up edge on the inside to guide the wheels of the carriage. These plates rest at each end on stone sleepers of three hundred or four hundred weight, sunk into the earth, and they are joined into each other so as to form a continuous horizontal pathway. These, of course, are double, and the distance between the opposite rails is from three to four feet and a half, according to the breadth of the car or wagon to be employed.

"When wrought iron is used (which is found to be equally cheap, with cast metal, and greatly preferable in many respects), the bars are made of smaller size, of a wedge shape, and twelve or eighteen feet long; but they are supported by sleepers at the distance of every three feet. The wagons used generally, run upon four wheels of from two to three feet in diameter, and carry from 20 to 50 cwt. . . . Yet a railway costs only about three times as much as a good turnpike road. It is obvious then that if railways were to come into general use two-thirds or more of the expense of transporting commodities would be saved."

The same magazine in a later issue contains the following: "That locomotive engines are not only capable of performing all that has been promised in some of the Prospectuses for new railroads, we are very ready to admit, nor would we indeed *wish to be hurled along at the rate of twenty miles an hour;* but that they are an important improvement in science, and in their application of human means to the great purposes of commerce, cannot, we think, be denied by any except those whose interest is directly opposed to the adoption of them."

In 1828 the Delaware and Hudson Canal Company constructed a railroad from its coal mines to Honesdale, Pa., the terminus of its canal, and the construction of the Baltimore and Ohio Railroad, and the South Carolina Railroad was commenced the same year.

The success of steamboat navigation led many to believe that the same thing could be accomplished on land, and inventions along this line sprang up in every part of the country. An enthusiastic inventer of Middletown, Conn., who constructed a steamboat to run on the Mississippi, and conveyed troops to Jackson's army at New Orleans in the War of 1812-15, wrote to a friend in Middletown about this time, saying: "I shall not return to Middletown until I go on a steam carriage of my own invention." This letter was shown the writer some years ago.

CHAPTER II

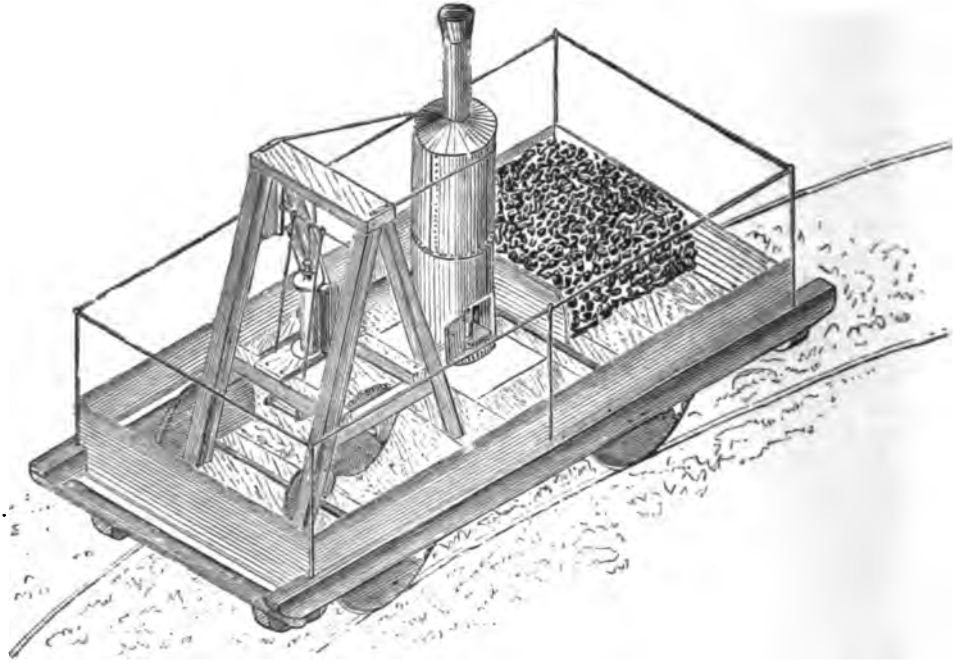
BALTIMORE AND OHIO RAILROAD; LOCOMOTIVE "TOM THUMB;" CHARLESTON, S. C., R. R.; FIRST LOCOMOTIVE, "BEST FRIEND;" SECOND LOCOMOTIVE, WEST POINT; PONTCHARTRAIN R. R. OF LA.; INVENTIONS AND IMPROVEMENTS IN RAILROAD CONSTRUCTION, BY COL. JOHN STEVENS AND HIS SON, OF HOBOKEN, N. J.

CONSTRUCTION OF THE BALTIMORE AND OHIO RAILROAD

The first meeting for the purpose of forming a railroad company in the United States to connect the waters of the East with the waters of the West, was held in the city of Baltimore, Feb. 12th, 1827. A charter was obtained from the Legislature, and on April 24, 1827, the company was organized. The laying of the corner stone of the road was by Charles Carroll, of Carrollton, then over ninety years of age, the only surviving signer of the Declaration of Independence. On this occasion he said "I consider this among the most important acts of my life, second only to my signing the Declaration of Independence, if even it be second to that."

The construction of the Baltimore and Ohio Railroad was commenced in 1828, and completed in 1852. Regarding its progress the *Baltimore American* of May 30, 1830, said:

"We understand that a critical examination of the entire line of the first division of the Baltimore and Ohio Railroad between this city and Ellicott's Mills, was made on Thursday last by the president and engineer of the company for the purpose of testing the solidity of the work. A car was loaded with double the weight intended hereafter to be transported on a single wagon, and was passed over the whole of the first and those parts of the second track which are finished, and it is highly gratifying to learn that, notwithstanding the recent heavy rains, which have placed the work in the most unfavorable condition, it sustained the pressure to the entire satisfaction of those interested in the work. About seven and a quarter miles of the single track are laid on wooden sleepers, and the remaining six and three-quarter miles on stone slabs. Such is the stability of this mode of construction that, in about 16,000 blocks, only forty were observed to be the least affected by the pressure. The horse-



BIRDS-EYE VIEW OF PETER COOPER'S LOCOMOTIVE.

it will be found that the "Cooper experiment" bears no comparison to the *real* locomotive designed by Col. Stevens in 1826.]

"The boiler of Mr. Cooper's engine was not as large as the kitchen boiler attached to many a range in modern mansions; it was of about the same diameter, but not much more than half as high. It stood upright in the car, and was filled above the furnace, which occupied the lower section, with vertical tubes. The cylinders were but three and a half inches in diameter, and speed was gotten up by gearing. No natural draught could have been sufficient to keep up steam in so small a boiler, and Mr. Cooper used, therefore, a blowing-apparatus, driven by a drum attached to one of the car-wheels, over which passed a cord that in its turn worked a pulley on the shaft of the blower. . . . Mr. Cooper, as with his own hands he opened the throttle, admitted the steam into the cylinder, and saw the crank-substitute operate successfully with a clacking noise, while the machine moved slowly forward with some of the by-standers, who had stepped upon it."

In a race he had with a horse, it is said, "the horse gained on the machine and passed it, and although the band, which had slipped from the drum was presently replaced, the horse was too far ahead to be overtaken, and came in the winner of the race.

Ross Winans in his account of the affair says: "On Saturday the 28th of August, 1830, the first railroad car propelled by steam proceeded the whole distance from Baltimore to Ellicott's Mills, and tested a most important principle—that curvatures of 400 feet radius offer no material impediment to the use of steam-power on railroads, when the wheels are constructed with a cone, on the principle ascertained by Mr. Knight, chief engineer of the Baltimore and Ohio Railroad Company, to be applicable to such curvatures.

"The engine (Cooper's locomotive-engine) started from Pratt street depot, taking the lead of a train of carriages. The power of the engine is a little, of any, over that of one horse, and it can therefore only be regarded as a working model. . . . It made the entire passage of thirteen miles in sixty-one minutes, including the four miles lost in taking in water at the middle depot."

In 1830 Mr. Cooper erected extensive iron works at Canton, near Baltimore, where he built from his own design this locomotive. He also carried on large wire and rolling mills at Trenton, New Jersey, and was the first person to roll wrought-iron beams for fire-proof buildings.

THE CHARLESTON, SOUTH CAROLINA, RAILROAD

The subject of establishing railroad communication between the city of Charleston, South Carolina, and Hamburg, one hundred and thirty-six miles distant, was under discussion by the people of that State as early as 1827. The *Charleston Courier* of December, 1827, says:

"The committee to whom this Charleston memorial was referred, is divided in opinion on the propriety of an appropriation for the survey of the country between Charleston and Hamburg. Some of the committee think that if the railroad is to be the work of a company, who is to receive all the profits, the whole expense should be borne by the company. And again, that if a survey be effected by the State, it would not be done so satisfactorily to the community as it probably would be if managed by individuals immediately interested."

A bill was passed December 19, 1827, and on January 4, 1828, a meeting of the citizens was called, and a committee appointed to report on that charter at the next meeting. The *Charleston Courier* of Jan. 7, 1828, said:

"A meeting of the citizens is requested at the City Hall, this day, at 1 o'clock, to take into consideration the report of the committee on the subject of a railroad from this city to Hamburg. At a previous meeting on January 4th, the sub-committee had reported unfavorably. This committee pointed out many parts of the General Act of the Legislature for incorporating companies for constructing turnpike-roads, bridges and ferries, that were inapplicable to a railroad company, as the bill now before the Legislature."

Soon after the reassembling of the Legislature the present charter of the South Carolina Railroad was granted; the exact date being January 29, 1828. A company was organized on May 12th following.

At one of the early meetings the name of Horatio Allen was mentioned, and he was invited to fill the position of chief engineer of the contemplated work, and Mr. Allen at their request made a report five days after their organization, recommending the kind of road to be constructed, and the kind of power best calculated to be used upon the road. Having visited England and made a thorough investigation of railroads and locomotives, in connection with the Delaware and Hudson Railroad, the directors had great confidence in his skill and judgment. In his report at the first meeting, Mr. Allen strongly urged the construction of the road for locomotive power, and at a meeting held on January 14, 1830, the report was acted upon, and a resolution adopted to the effect that the locomotive alone should be used upon the road, and in selecting that power for its application to railroads, the maturity of which will be reached within the time of constructing the road, would render the application of animal power a great abuse of the gifts of genius and science."

In later years Mr. Allen, in referring to the action of the company said: "In the recommendation of this report in favor of locomotive-power the Board of the South Carolina Railroad Company unanimously concurred, and, as this decision was the first on any railway built for general freight and passenger business in this country or in England, it has been referred to as one of the "interesting facts in the early history of railroads."

Nine months after Mr. Allen's report, the "Best Friend," built at the West Point Company's foundry at Cold Spring, Putnam county, N. Y., was ready for shipment to Charleston for use on the South Carolina Railroad Company's road.

THE LOCOMOTIVE, BEST FRIEND, OF CHARLESTON, S. C.

Mr. David Matthew, who was foreman of the hands fitting up machinery in the West Point Foundry and had charge of those fitting up the Stourbridge Lion when she came from England, also had charge of the men fitting up the "Best Friend," the first locomotive ever built in America, for actual service on a railroad. In the same letter, which he addressed to the author in 1859, he said:

THE FIRST AMERICAN-BUILT LOCOMOTIVE for actual service upon a railroad was called the "Best Friend, of Charleston." I had charge of the hands fitting up this engine; this was in 1830, shortly after the Stourbridge Lion had been tried in our yard, and some modifications made to it. The locomotive, "Best Friend, of Charleston," was contracted for by Mr. E. L. Miller, of Charleston. The "Best Friend" was a four-wheel engine, all four wheels drivers. Two inclined cylinders at an angle, working down on a double crank, inside of the frame, with the wheels outside of the frame, each wheel connecting together outside, with outside rods. The wheels were iron hub, wooden spokes and fellars, with iron tire, and iron web and pins in the wheels to connect the outside rods to.

"The boiler was a vertical one, in form of an old-fashioned porter-bottle, the furnace at the bottom surrounded with water, and all filled inside full of what we call trats, running out from the sides and top, with alternate stays to support the crown of the furnace; the smoke and gas passing out through the sides at

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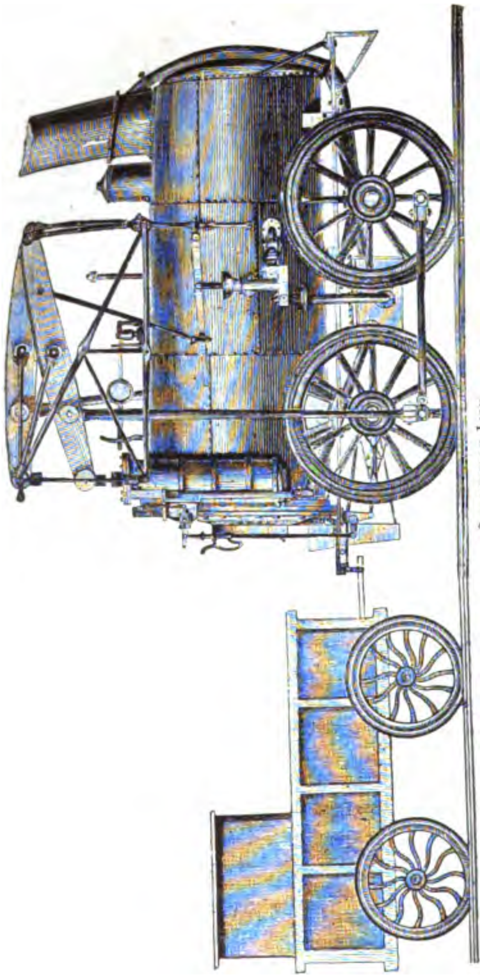


Stourbridge Lion.

several points, into an outside jacket, which had the chimney on it. The boiler sat in the centre of the four wheels, with the connecting-rods running by it to come into the crank-shaft. The cylinders were about six inches in the bore, and sixteen inches' stroke. Wheels, about four and a half feet in diameter. The whole machine weighed about four and a half tons. It was shipped to Charleston, South Carolina, for the Charleston and Hamburg Railroad in the fall of 1830, and was put upon that road during the winter.

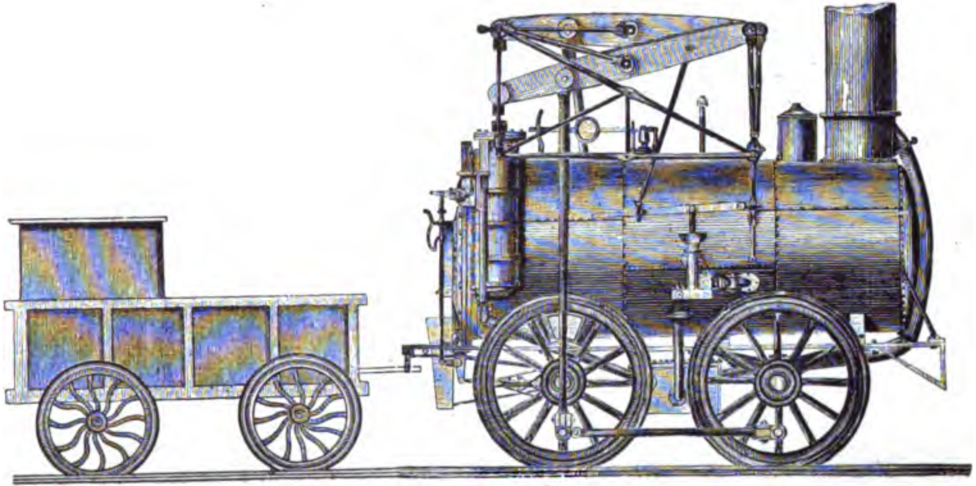
"It was the first locomotive built in America; was exhibited in our shop under steam for some time, and visited by many. She was shipped to Charleston on board the ship Niagara in October, 1830.

During the first trial of the "Best Friend," a "lateral was brought to act on the spokes of the wheel, and they proved too weak to resist it, the engine, after proceeding about twenty feet was stopped with both the front wheels off the rail and some of the spokes much injured. . . . It is but justice to state that the wheels were made after the English wheels, the most approved until the construction of the wrought iron ones."

"On the 14th and 15th of December, 1830, the engine was tried and proved her force and efficiency to be double that contracted for; running at the rate of sixteen to twenty-one miles an hour, with forty to fifty passengers in some four or five cars, and, without the cars, thirty to thirty-five miles per hour."

The Charleston *Courier* of January 17, 1831, gives the following account of an excursion made about this time: "On Saturday last, the first anniversary of the commencement of the railroad was celebrated. Notice having been previously given, inviting the stockholders, about one hundred and fifty assembled in the course of the morning at the company's building in Line street, together with a number of invited guests. The weather, the day, and night previous had been stormy, and the morning was cold and cloudy. Anticipating a postponement of the ceremonies the locomotive-engine "Best Friend," of Charleston, had been taken to pieces for cleaning, but upon the assembling of the company she was put in order, the cylinders new packed, and at the word, the apparatus ready for movement. The first trip was performed with two pleasure-cars attached, upon which was a detachment of United States troops and a field-piece which had been politely granted by Major Belton for the occasion.

This engine was ordered from the West Point Foundry, and constructed from plans sent by Horatio Allen, Esq., the chief engineer of the road. Mr. David Matthew, who gave a descrip-



Stourbridge Lion.

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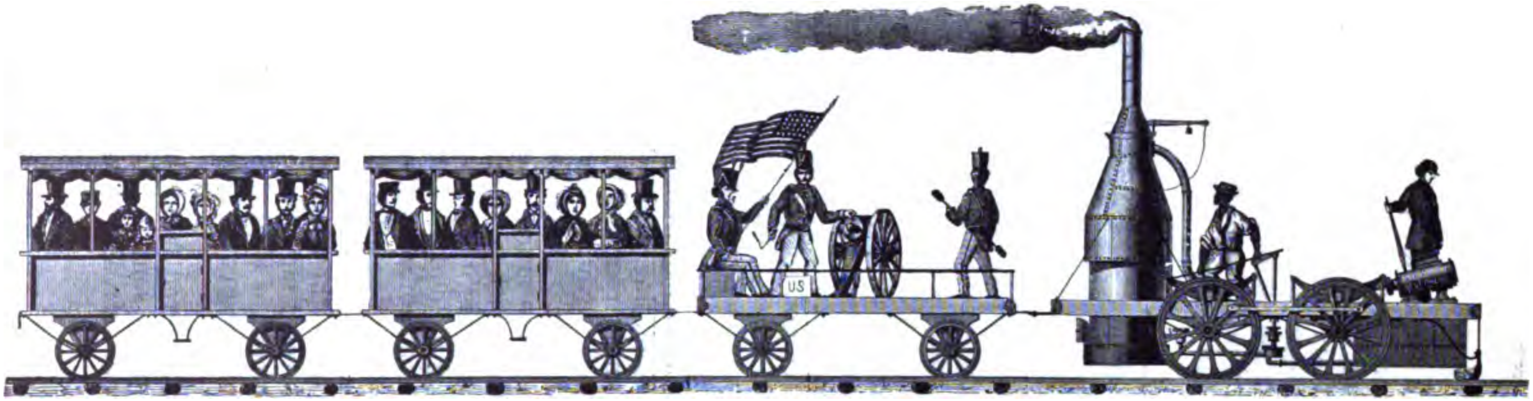
The "Best Friend," the First Locomotive built in the United States for actual service on a Railroad.



The "Best Friend" was built at the West Point Foundry Shops, in New York City, for the South Carolina Rail-Road, and after several experimental trials, in November and December, 1830, made the first excursion trip, as above, on Saturday, 15th January, 1831, being the anniversary of the commencement of the road. See extract from *Charleston Courier*, page 152.

tion of the "Stourbridge Lion," says of this, the second locomotive built for the South Carolina Railroad:

"American locomotive number two was called the 'West Point.' This engine was contracted for by Horatio Allen, and was commenced by me in the fall of 1830, and completed and shipped to the Charleston and Hamburg Railroad about the middle of February, 1831. This locomotive had the same size of engine, frame, wheels and cranks as the 'Best Friend,' but had a horizontal tubular boiler. The tubes were two and a half inches in diameter, and about six feet long."

This locomotive arrived at Charleston by the ship Lafayette on Monday, February 28, 1831. The *Charleston Courier* of August 1, 1831, said:

"On Saturday afternoon, March 5, 1831, the locomotive 'West Point' underwent a trial of speed, with the barrier car and four cars for passengers, of which number fifty were ladies in the four cars, and nine persons on the engine, with six bales of cotton on the barrier car, and the trip to the Five-mile House, two and three-fourths miles, was completed in eleven minutes, when the cars were stopped to oil the axles about two minutes. The two and one-fourth miles to the forks of Dorchester road were completed in eight minutes.

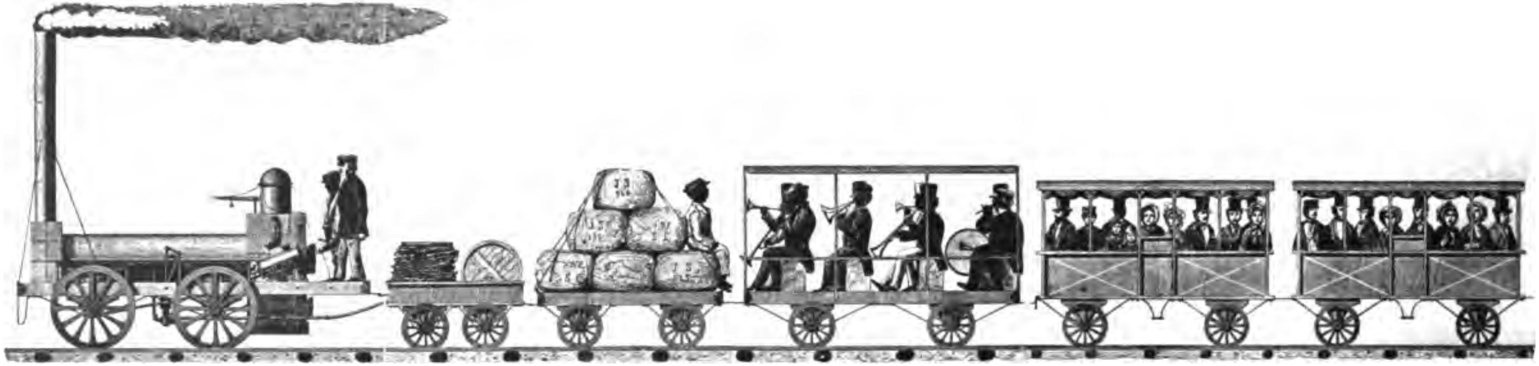
"The boiler of the 'West Point' was horizontal, with tubes or flues running lengthwise with the boiler about five or six feet long, and about three inches in diameter. These tubes, or flues, were riveted to the fire-box and to the other end of the boiler. They were made of iron, and the water in the boiler surrounded them, and the flame and smoke passed through the tubes into the smoke box."

The "South Carolina," an eight-wheel engine, built at the same establishment, on a plan furnished by Mr. Horatio Allen, chief engineer of the road, and was said to be the first eight-wheel engine ever built.

POUTCHARTRAIN, LA., RAILROAD

Among other claimants to the honor of being the first projectors of railroads in America, are those representing the Poutchartrain Railroad of New Orleans, La. "A Guide to New Orleans," (New Orleans Press, 1885), says: "The Poutchartrain Railroad out Elysian Fields street to Milenberg, was the first railroad for general transportation completed in the United States, and was opened for traffic in 1830. The Albany & Schenectady, Baltimore & Ohio and Camden & Amboy roads were commenced about the same time as the Pontchartrain Railroad, but the latter was completed and in use before any of the others.

The "West Point," the Second Locomotive built in the United States for actual service on a Railroad.



The "WEST POINT" was built at the West Point Foundry Works, in New York City, for the South Carolina Rail-Road, and after several experimental trials, in February, 1831, made the first excursion trip, as above, on Saturday afternoon March 5th, 1831. See extract from *Charleston Courier*, page 108.

"The loading and unloading of freight to and from the cars was by means of a crane by which it was picked up or deposited on the floor of the depot. Captain Grant (the superintendent) concluded that the handling of freight would be greatly facilitated by building a raised platform. Thus it is that New Orleans not only has the honor of having the first railroad on the continent, but also that of the first freight platform in the world. It was not until after the year 1838 that the raised platform was finally adopted generally throughout England and Europe.

"The iron rails on this road were originally nothing but bars of iron perforated at short intervening distances, with drilled holes to allow spikes or screws to be driven into wooden sills, which were bolted on top of the cross ties."

This road for the most part led through a cypress swamp, and the road bed was formed by laying cypress stringers about ten to twelve feet long on the top of which were laid the cross ties. The author of this work was Secretary of the Pontchartrain Railroad Company in 1859, and that year had the old rails taken up and exchanged for new Philadelphia rails, the difference in value of the old wrought iron rails being sufficient to cover the cost of the new rails.

This road up to and for some years after the close of the Civil War, formed the connecting link between the North and the great Southwest; freight and passengers being conveyed from the terminus of the road by a line of steamers to Mobile. Steamers to all the leading watering places across Lake Pontchartrain and along the coast of Southern Mississippi received all their freight and passengers by this road. A pier nearly a mile in length extended from the little hamlet of Milenberg out into the lake to deep water. For a short road, only about six miles long, it was one of the best paying roads in the United States. The stock was never placed on the market and transfers of stock were very infrequent.

THE STEVENS FAMILY OF HOBOKEN, NEW JERSEY, AS ORIGINATORS AND PROMOTERS OF THE RAILROAD

The Stevens family of Hoboken, N. J., the pioneers, inventors and promoters of steamboat enterprises, probably did more to lay the foundation of our great railroad system than any one man or family of men in this country.

Colonel John Stevens, a native of New York city, a large property owner in, and for many years a resident of Hoboken, New Jersey, was among the first to demonstrate the practicability of railroads, and, with rare foresight, he unconsciously ful-

HENRY WHITTEMORE
Secretary of Pontchartrain R. R. Co. 1859-60. Compiler of this work

filled the prophecy made by Oliver Evans many years previous. A pamphlet published by Col. John Stevens in May, 1812, on "Railroads and Steam Carriages," shows that as early as 1790 he became so thoroughly convinced of the great superiority of railroads over canals for purposes of internal communication and the transportation of passengers and produce, that when, in 1810, the project of connecting Lake Erie with the Hudson was so seriously discussed as to lead to the appointment by the Legislature of commissioners to examine the routes and report on the possibility of the work, Col. Stevens, after seeing their report earnestly pressed upon the commissioners (of whom Robert Fulton was one) as preferable alike in economy, speed and rapidity of construction a system of railways adapted to steam carriages. Col. Stevens in his report says: "But there remains another important point of view in which the improvement demands the attention of the general government; the celerity of communication it would afford with the distant sections of our wide extended empire is a consideration of the utmost moment. To the rapidity of the motion of a steam carriage on these railways, no definite limit can be set. The flying proas, as they are called by voyagers, belonging to the natives of the islands in the Pacific Ocean, are said at times to sail more than twenty miles an hour, but as the resistance of the water to the progress of the vessel increases as the squares of her velocity, it is obvious that the power required to propel her must also be increased in the same ratio. Not so with a steam carriage, as it moves in a fluid eight hundred times more rare than water, the resistance arises from friction which does not increase in a direct ratio with the velocity of the carriage. If then a proa can be driven by the wind, (the propulsion power of which is constantly diminishing as the velocity of the proa increases), through so dense a fluid as water, at the rate of twenty miles an hour, I can see nothing to hinder a steam carriage from moving on the ways with a velocity of one hundred miles an hour.

"In a military point of view the advantages resulting from the establishment of these railways would be incalculable. It would at once render our frontiers on every side invulnerable. Armies could be conveyed in twenty-four hours a greater distance than it would now take them weeks or even months to march."

Colonel Stevens was anxious to put his recommendations of 1812 into practice. In 1817 he obtained a charter "to build a railroad from the river Delaware, near Trenton, to the river Raritan, near New Brunswick." This was undoubtedly the earliest charter of a railroad granted in America; but no tangible result followed, because the scheme was then regarded as wild and visionary. The introduction of the steamboat, coupled with the success of the Duke of Bridgewater in the introduction of canals abroad, had made them more popular with capitalists than the untried railroad, and no money could be raised for that undertaking. Colonel Stevens regretted that his financial condition was not such as to warrant him in building the road at his own expense. The road from New Brunswick to Trenton which he desired to lay, is almost the exact line between these two cities now occupied by the New Jersey Division of the Pennsylvania Railroad Co.

In 1823, with Stephen Gerard and Horace Binney as his associates, Colonel Stevens organized the movement for constructing a railroad from Philadelphia to Harrisburg and Pittsburg, which resulted in the incorporation of the first Pennsylvania Railroad Co., twenty-three years before the present corporation was chartered.

For the purpose of proving to the world the practicability of the theories he had so long advocated, Colonel Stevens, in 1826, then seventy-six years old, constructed at his own expense a locomotive with a multitubular boiler which he operated for some years on a circular track on his estate at Hoboken. It was probably the best educator ever devised, and thousands who then witnessed its operations, lived to see the fulfillment of Colonel Stevens's prophecies. Fortunately for posterity and in proof of the genius of the inventer, a model of this locomotive, with the original multitubular boiler which formed a part of it, is preserved in our National Museum.

Notwithstanding his advancing years Col. Stevens was firm in his conviction that the time was near when railroads would supplant every other means of inland transportation. In 1828 railroad construction was well under way in several sections of the country. In spite of this there were many who thought a steam railroad in New Jersey could not be made to pay. Numerous petitions had been presented to the New Jersey Legislature in 1828-9 praying for the incorporation of a railroad company. Opposed to this were the advocates of the canal; and a deadlock between the friends of the two interests was the result. A compromise, however, was effected when, in January, 1830, Robert L. and John C. Stevens, representing the railroad interests, met by chance, Commodore Robert F. Stockton, representing the canal interests, in the lobby of the Park Theatre, New York. As a result of this meeting a charter was granted to the Camden & Amboy Railroad & Transportation Co., and another charter to

FIRST TRAIN ON THE CAMDEN & AMBOY RAILROAD the Delaware & Raritan Canal Co., on the same day, Feb. 4, 1830.

The Stevens Brothers, Robert L. and Edwin A., together with their father, Colonel John Stevens, became the active managers of the road. Robert L. took charge of laying the track and procuring equipment, while the other looked after the political, financial and practical management of affairs. Robert L. Stevens was elected President and Engineer of the new railroad company on the 28th of April, 1830, and sailed for Europe in October following. After attending to the work of obtaining the T rail, which he had designed, he went to the works of George and Robert Stephenson at Newcastle-on-Tyne, where the famous locomotive "Rocket" had been built. At that time Mr. Stevens contracted for the locomotive afterwards known as the "John Bull." He then returned home and built a railway track 1,067 1-2 feet long, with his rails laid on stone blocks, near Bordentown, where, on the 12th of November, he exhibited to the Legislature of New Jersey the capabilities of the railway and the locomotive. The road was formally opened for traffic from Bordentown to Hightstown, Oct. 9, 1831, but locomotives were not used until August, 1835, when a sufficient number had been made.

Mr. Stevens designed the "hook-headed" spike which is still in use, which has developed into the fish-bar, and the rivets, which have been replaced by the bolt and nut, to complete the joint.

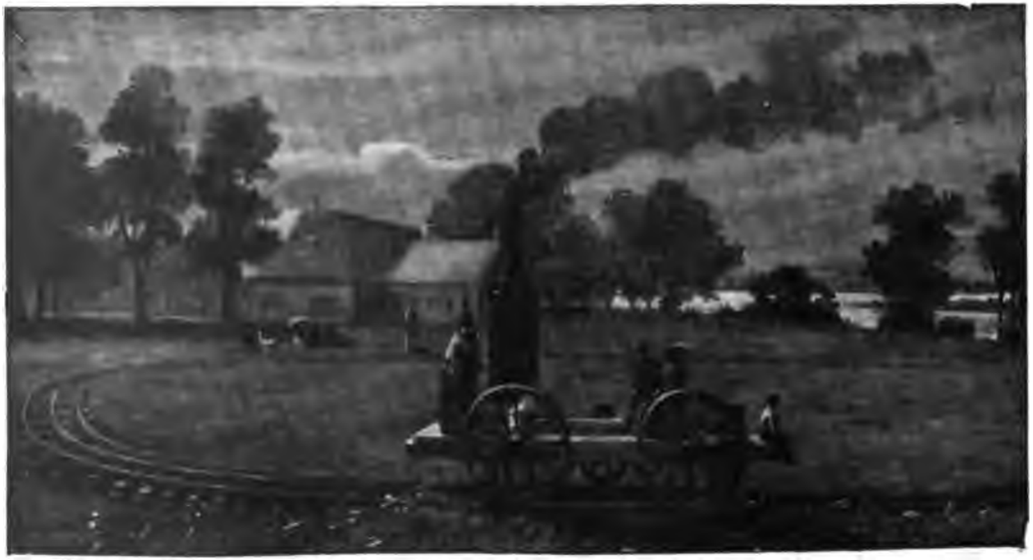
One authority in referring Stevens's operations says: "Robert L. Stevens, son of the distinguished Col. John Stevens, was engaged in building the Camden and Amboy Railroad in 1830, and first laid the standard form of rail known as the "Stephens rail" in this country, and as the "Vignalles" in Europe. He purchased a locomotive of the Stephensons soon after the trial at Ramhill called the "John Bull," and its first public trial on the partially built road at Bordentown occurred in April, 1831. That old engine was exhibted at the Centennial Exhibition in 1876. The railroad was opened for traffic about 1833, and the engines used were made from designs of Stevens at Hoboken.

A contemporaneous writer states that "The village of Bordentown upon a sultry day in the middle of August, 1831, was all excitement; for there stood upon the wharf, surrounded by a crowd of curious, the locomotive 'John Bull,' or No. 1, which had been recently completed at the English works of Stephenson & Co. To Isaac Dripps, later master mechanic of the Camden and Amboy Railroad, whose technical education had been acquired with the Stevenses in their experiments with steamboats on the Delaware and Hudson, was assigned the duty of

ROBERT L. STEVENS

assembling the parts of the 'John Bull.' Without directions or drawings, Dripps, who had never seen a locomotive, prepared the engine, weighing ten tons, for track work. A tender was made from a converted four-wheel flat car used by the contractor, the tank being a large whiskey barrel, and the supply of water conveyed to the boiler by short sections of shoe leather hose made by a Bordentown shoemaker. After a preliminary test on the 12th of November, 1831, in the presence of the members of the Legislature and invited guests of prominence. Attached to the locomotive were two four-wheeled coaches, built to be drawn by horses if need should occur. These coaches were practically carriage bodies, three doors to a side with the seats facing each other, and built upon English models by the Greens of Hoboken. The first woman to ride upon the train was Madame Murat, of Bordentown, wife of Prince Murat by marriage to Napoleon Bonaparte."

The painting from which the accompanying engraving was made represents a man riding on horseback ahead of the train to warn people to keep off the track. So great was the excitement that every precaution was taken to guard against accidents. There were then no "whistles" or "cowcatchers" to give warning or remove obstructions. There were no "interferences or injunctions" to hinder or prevent the running of trains, and the Stevenses had cause to congratulate themselves on this their first effort at railroading.



COL. JOHN STEVENS'S LOCOMOTIVE
On Circular Track in Hoboken, N. J., 1826

CHAPTER III

Railroad Development in the Empire State; Progress of Railroads in the State. Mohawk and Hudson Railroad. Catskill and Ithaca R. R. Canajoharie and Catskill R. R. Cayuga and Susquehannah R. R. Saratoga and Schenectady R. R.

A well known writer on railroad affairs said in 1861: "Thus in the last twenty-five years a thousand million of dollars has been spent in the construction of roads. . . . These rails give circulation to all the surplus capital that is created by labor within that circle. It is on this principle that may be explained the immense prosperity that has been seen to attend the enormous expenditure of railroads, praticularly during the last ten years. The great advantage of railroads is that they practically diminish distances between places in proportion to the speed attained."

The same writer says: "In New York the question of railroads had been early discussed. A publication of Col. Stevens of Hoboken, in 1812, advocated a railway instead of a canal to the lakes, but his proposition was opposed by Chancellor Livingston on grounds which indicate very odd ideas of the nature of the work."

New York was the pioneer State in railroad enterprises, and while others were doubting, hesitating and discussing their practicability, railroad companies were being organized in every part of the State involving millions of dollars. Col. John Stevens who first suggested and demonstrated their practicability was a native of New York. Hundreds of capitalists in every part of the State were ready to invest their money in what seemed to them a safe and sure enterprise, which would yield satisfactory returns. During the first twenty-five years—from 1830 to 1855—there were, in addition to the roads which proved successful, or partially so, ONE HUNDRED AND TWENTY-FIVE COMPANIES organized which never laid a rail.

The first regular application for a railroad charter made to the New York Legislature, was by Stephen Van Rensselaer and others in 1826 for power to constuct a railroad between the Hudson and the Mohawk rivers, and they "received the grant," says one writer, "for the reason that no railroads were then in the country at all, and that as the petitioners were willing to make the experiment at their own cost it was a good opportunity to permit it." The surveys for the road were not made until 1830, and the road was opened in September, 1831."

"Meantime the charters of the Harlem and the Saratoga and Schenectady had been granted. The opening of the Mohawk road caused much excitement. A road from the Hudson to the lakes was agitated, and applications were made to the Legislature in 1832 for *forty-nine roads,* of which twenty-nine charters were granted, and of this number six were constructed, viz.: The Brooklyn and Jamaica, Hudson and Berkshire, Erie, Rensselaer and Saratoga, Tonawanda, Watertown and Rome. In 1835 six railroads were chartered; of these, the Utica and Schenectady, the Whitehall and Rutland, and Buffalo and Black Rock were constructed. In 1834 ten railroads were chartered, and of these five were constructed, the Auburn and Syracuse, Buffalo and Niagara Falls, Long Island, Lockport and Niagara, and the Saratoga and Washington. In 1836 forty-three railroads were chartered, seven of which were built, the Albany and West Stockbridge, Albany and Buffalo, Auburn and Rochester, Attica and Buffalo, Lewiston, Schenectady and Troy, Skaneateles and Utica. In 1837 fourteen railroads were chartered, but none of them were constructed. In 1838 the State authorized a loan of its credit to the extent of $3,000,000 to the Erie Railroad, and $100,000 to the Catskill and Canajoharie, and $250,000 to the Auburn and Syracuse. In 1839, the Oswego and Syracuse railroad was chartered; and the city of Albany lent $400,000 to the Albany and West Stockbridge road. In 1840 acts were passed by the Legislature to loan the credit of the State to the extent of $3,478,000 to six roads; and provision was made for a sinking fund to be paid into the treasury by the railroad companies except the Erie. In 1840 the city of Albany was authorized to invest $350,000 in the Albany and West Stockbridge road. The Erie, having defaulted on its interest, was advertised for sale by the Comptroller, which did not take place, however. This was not the case with the Ithica and Orange, which was sold for $4,500, and the Catskill and Canajoharie for $11,000. In 1845 the several railroads from Albany to Buffalo were, for the first time, permitted to transport freight on the closing of the canal by paying the State the same toll as the canal would have paid. In 1846 the Hudson River and the New York and New Haven roads were chartered. In 1847 the seven roads, making the line from Albany to the lakes, were required to lay down an iron rail of fifty pounds to the yard. They were likewise authorized to carry freight all the year by paying canal tolls; and all the railroads were made liable for damages in case of death by neglect of the companies' agents. In 1848 the general railroad law was passed. The law provided, however, that the Legislature should decide whether the 'public utility' of the road justifies the taking of private property. From 1826 to 1850, one hundred and fifty-one charters were granted, and of these thirty were carried into effect. The line from Albany to Buffalo was composed of seven distinct companies finished at different times. Most of these were restricted as to fares. The Mohawk and Hudson—or Albany and Schenectady—was not restricted."

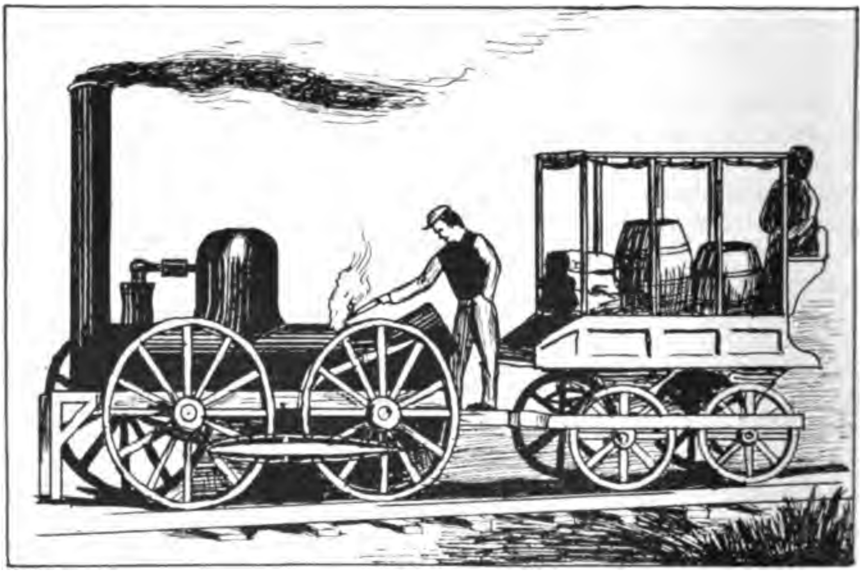
THE MOHAWK AND HUDSON RAILROAD COMPANY

Stephen Van Rensselaer and others, on April 17, 1826, obtained a charter from the Legislature of New York to construct a railroad between the Mohawk and the Hudson, connecting Albany with Schenectady. This, as has already been stated, was the first charter ever granted for any railroad in the United States. The company had a capital of $300,000, and by charter obtained the privilege, if necessary, to increase the capital to $500,000.

The credit of this enterprise is probably due to Mr. George W. Featherstonaugh more than to any one else in the State. The History of Albany County, N. Y., states that Mr. George W. Featherstonaugh, an honored and influential citizen of Schenectady, and his father, George W. Featherstonaugh, were among the first and leading projectors of this enterprise. As early as 1812 he published a pamphlet explaining the superior advantages of railways and steam carriages over canal navigation.

In 1825 a writer in the Albany *Argus* urged upon capitalists the absolute necessity of their building a railroad from Albany to Schenectady, under the plea that it was the only course to take to prevent Albany going to decay through the rivalry of Troy. It thus appears that local jealousies had much to do in furthering this enterprise.

"Mr. Featherstonaugh, in a letter to the Mayor of Albany, said the transportation of property from Albany to Schenectady was seldom effected in less than two, and sometimes three days. By railroad, he argued, the communication between the same points could be made in winter and summer in three hours at no greater cost than by canal, paying for sixteen instead of twenty-eight miles. He regarded this experiment, which he believed to be practical, as a test whether this economical mode of transportation would succeed in this country.



MOHAWK & HUDSON FOUR-WHEEL LOCOMOTIVE
(Dewitt Clinton) 1831

"The bill introduced by Mr. Featherstonaugh passed the Assembly March 27, 1826, as stated, granting a charter for fifty years, and limiting the time for construction to six years. Stephen Van Rensselaer, known as the 'old patron,' of Albany, and George W. Featherstonaugh of Schenectady, were the only persons named as directors in the charter. On the 26th of June of that year books were opened for subscription to the stock of this road, and the stock was eagerly taken up by capitalists, but for some cause the company moved slowly; for more than four years elapsed before the road was begun.

"On the 20th of July, 1830, the ceremony of breaking ground for the Mohawk and Hudson Railroad took place near Schenectady, with a silver spade, by Stephen Van Rensselaer. In September it was announced that stock had risen ten per cent.; and the editor of the Albany *Daily Advertiser* predicted that trains would run from Albany to Schenectady in a quarter of an hour, and reach Utica from Albany in four hours.

By the 25th of July, twelve months from the time when the ceremony of breaking ground was performed, the road was completed from the junction of the Western Turnpike and Lydia street, Albany, to the brow of the hill at Schenectady. Both of these points were at first reached by stages, and afterwards by an inclined plane, the passengers being carried to the railroad station in a car drawn by a rope by means of stationary engines.

The first locomotive used on the road was called the DeWitt Clinton, which was the third locomotive constructed by the West Point Iron Works of New York. On August 3d a trial trip was made a distance of twelve and a half miles in forty-five minutes; and on the 10th they ran a train a day each way.

On August 13th a large company assembled to take a trip on the railroad, but the engine proved defective in her boiler and was retired for repairs. At this trial, and on previous ones coal or coke had been used for fuel, but wood was finally adopted.

On the 9th of September the DeWitt Clinton was again put upon the railroad and succeeded in drawing a train over the road in forty-five minutes.

On September 24, 1831, an excursion over the road was given by the directors, to which were invited the State and city officials and eminent citizens. Of those who were present on this occasion were Governor Enos T. Thropes, Lieut.-Governor Edward P. Livingston, Senator Charles E. Dudley, Comptroller Azariah C. Flagg, ex-Governor Joseph C. Yates, Chancellor Reuben H. Walworth, Stephen Van Rensselaer, Francis Bloodgood, Joseph Alexander, John Meigs, Erastus Corning, Lewis Benedict, John

Boyd, Thurlow Weed, William Bay, Simon DeWitt Bloodgood, William B. Winne and L. H. Tupper, of Albany; Samuel Swartwout, Philip Hone and Jacob Hays, of New York; John L. D. Grant, of Schenectady; David Matthews, builder; Churchill C. Camberling, President of the road; Chief Consulting Engineer F. C. Ward; Paymaster, Dudley Farline; W. Benedict, Superintendent, and others.

In the spring of 1832 the road was completed through the whole line, and the inclined plane being in working order, another grand excursion was given on the 14th of May, extending from the foot of Ganesvoort street, Albany, into the heart of Schenectady. The cars were drawn up the incline by means of a long rope attached to them, and a stationary engine at the top; the whole steadied and balanced by a car loaded with stone, descending on the opposite side track. The same ceremony was observed at both terminations of the road, occupying much time. The same style of coaches were still used. In the fall of this year a new pattern of car was built at Schenectady, more nearly like those now in use, the architecture of which was modeled from Dr. Nott's parlor stove, and was called the "Gothic Car."

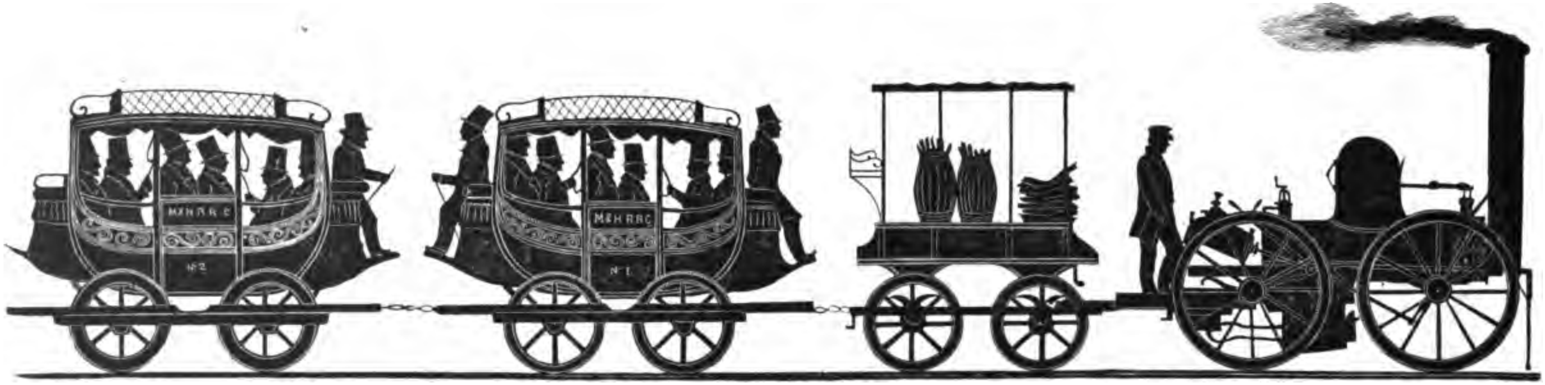
In 1833 the company had a road fifteen and three-quarter miles long, with a double track. The width between the rails was four feet six inches. The rails were made of timber on which iron bars were fastened. In January, 1832, the Company reported to the Legislature that the amount actually paid and disbursed in the construction of the road was $483,215, and that $156,693 would be required to complete it. In 1833 the cost of the road had run up to $1,100,000. Its shares sold at thirty per cent. premium to begin with, but later they sold for only twenty-five cents on the dollar. It was then bought up by more enterprising parties; the inclined plane system was abolished; a longer grade, curving up the hill from Albany was substituted, and the twelve miles replaced by heavy iron ones. On September 22, 1843, a train of three cars ran from Albany to Schenectady in thirty minutes.

From 1843 to 1851, when the first great trunk line was put in operation the intervening years were filled with railroad enterprises, and almost every portion of the State growing even more bold in conception, and more successful in execution of operation. It was believed and asserted by many, that, as predicted by some of our great statesmen, the State of New York was hastening on its way to supremacy, and could be justly entitled to the name of the Empire State.

The legitimate and successful railroad enterprises led to many speculative schemes that resulted in considerable expenditure

THE FIRST LOCOMOTIVE AND TRAIN OF PASSENGER-CARS EVER RUN IN THE STATE OF NEW YORK.

The American Locomotive "De Witt Clinton," Mr. David Matthew, Engineer.



The locomotive "De Witt Clinton" was ordered by John B. Jervis, chief engineer of the Mohawk and Hudson Railroad, and was the third locomotive built in America for actual service upon a railroad. The machine was made at the West Point Foundery Works in New York, taken to Albany in the latter part of June, 1831, and was put upon the road and run by David Matthew. The first experimengtal trial-trip was made on the 5th of July, and others at different times during that month. The first excursion-trip, with a train of passenger-cars, was made from Albany to Schenectady on August 9, 1831, on which occasion the author of this History of the Early Locomotives in America rode in one of the cars (only the first two are represented above), and before the train started made the sketch as it appears above, which was pronounced a truthful representation of the locomotive, tender, and the first two of the number of cars in the train, and correct likenesses of the engineer and passengers represented in the cars. Some of them are yet living, as their letters in this work will show. The picture was cut out of black paper with a pair of scissors, a peculiar art with which the author was gifted from his earliest boyhood. The original picture was presented by the author to the Connecticut Historical Society; it was about six feet in length, and is yet preserved by the society and highly valued for its antiquity and truthfulness. The names of the engineer and passengers are as follows, commencing at the engine: David Matthew, engineer; first car, Erastus Corning, Esq., Mr. Lansing, ex-Governor Yates, J. J. Boyd, Esq., Thurlow Weed, Esq., Mr. John Miller, Mr. Van Zant, Billy Winne, penny postman; second car, John Townsend, Esq., Major Meigs, old Hays, High-Constable of New York, Mr. Dudley, Jos. Alexander, of the Commercial Bank, Lewis Benedict, Esq., and J. J. Degraft. These likenesses were all readily recognized at the time they were taken—forty years ago. The outside seats were for the drivers when these cars had been drawn by horse-power, but on this occasion were occupied by the excursionists.

of means to promote, but with very unsatisfactory results. Among these was the Catskill and Ithica Railroad in Greene County, N. Y.

THE CATSKILL AND ITHICA RAILROAD

This road was incorporated April 21, 1828, for the purpose of constructing a railroad from Catskill to Ithica "to transport, take and carry property and persons upon the same by the power and force of steam, of animals, or any mechanical or other power, or any combination of them which the said corporation may choose to apply." The capital stock was fixed at $1,500,000, in fifty dollar shares, and the State reserved the right to subscribe for one thousand shares. In case the right was exercised, the comptroller was to become *ex-officio* a director. Jacob Haight, Thomas B. Cook, Francis A. Bloodgood, Ebenezer Mack and associates were named in the act, and Jacob Haight, Thomas B. Cook, and Orrin Day were appointed commissioners to open subscription books at Catskill. The corporation was authorized to allow persons to use the railroads with "suitable and proper carriages," by paying tolls at the gates which the company might erect as soon as ten miles of the road were completed. An act of March 29, 1829, extended the time for opening subscription books to the following year. While the enterprise did not prove successful it indicated the interest which had been awakened in Greene county, which culminated in another project a little later.

THE CANAJOHARIE AND CATSKILL RAILROAD

The scheme of constructing a railroad from Catskill to the West, which gave birth to the Catskill and Ithica project, found another expression in this enterprise. The act of incorporation was passed April 19, 1830, naming as incorporators William Deitz, Thomas B. Cook, Clarkson Crolius, Henry Leiber, James Lynch, George Spencer, Israel Foote, John Adams, Herman J. Ehle, Harmon J. Quackenbos, and George Sprakes. The capital stock was to consist of $600,000 in fifty dollar shares. The commencement of the work was opened with great display; the following, comprising only a part of the extensive programme:

ORDER OF
ARRANGEMENTS
For celebrating the breaking of ground of the
CANAJOHARIE AND CATSKILL
RAIL ROAD
On Thursday the 27th Oct. 1831
Thirteen Guns at Sunrise

This was followed by the ringing of bells and an immense gathering of people who marched in procession, with bands of music, and orations by the distinguished men of the day.

The company was organized and ready for business early in the summer of 1835, but nothing was done on the road except surveying, until the fall of that year, when ground was broken near the creek at Catskill. In 1836 contracts were given out through the whole length of the line, and it was expected the road would be completed by the close of 1837. The charter was amended April 20th, 1837, so as to increase the capital stock $1,000,000, and authorized the directors to borrow to the amount of $400,000 for the completion of the road, and to secure the loan by a mortgage upon the property and stock of the company.

The railroad was not successful. It was used mainly for the transportation of freight in connection with the great tanning interests.

Among the earliest railroad enterprises following that of the Mohawk and Hudson was the Ithica and Oswego Railroad which subsequently became the Cayuga and Susquehannah Railroad.

THE CAYUGA & SUSQUEHANNAH RAILROAD

This road under the former name was chartered June 28, 1828,—the second railroad charter granted in the State. The road was opened in April, 1834. An inclined plane at Ithica rose 1 foot 4 28-100 feet, and stationary steam power was used for drawing up the cars. Above this was another inclined plane that rose one foot in 21 feet, on which horse power was used. The road was subsequently sold to the comptroller on stock issued by the State, on which the company had failed to pay interest. A new company was organized, and the above name assumed April 18, 1843. The road was reconstructed; the inclined planes were done away with, and on January 1, 1855, it was leased to the Delaware, Lackawanna & Western Railroad Company, and operated by them as the Cayuga division. This became an important route from the coal mines of Pennsylvania; coal and iron forming the principal item of business.

THE SARATOGA & SCHENECTADY RAILROAD COMPANY

This Company was chartered by the State Legislature February 16, 1831, and was empowered to "construct and maintain a steam railroad between Schenectady and Saratoga Springs, passing through the village of Ballston Spa. The incorporators named in the act were Henry Walton, John Clarke, William A.

Langworthy, John H. Steele, Miles Beach, Gideon W. Davison, Rockwell Putnam and 'such other persons as shall associate with them for that purpose.' " The road was directed by law to be either single or double track; to pass as nearly as practicable through the village of Ballston Spa. The charter was for fifty years. Churchill C. Cambridge, Samuel Young, Thomas Palmer, Daniel T. Toll, John J. DeGraff, William James, James Stephenson and John Townsend were designated as commissioners to receive subscriptions to the capital stock of $150,000.

The road was commenced September 1, 1831, and was opened for business July 12, 1832, except a short distance at Ballston, which was completed in April, 1833. The length was twenty-one and a half miles, and cost $217,201.22, exclusive of the land it occupied. Incidental and other expenses brought the cost up to $297,237.00. About three miles of the road was laid on a stone foundation. Trenches were dug about two by two and a half feet, and filled with broken stone, closely rammed, and upon this square blocks of about two cubic feet were placed three feet from centre to centre. On these stone blocks cast iron chairs were placed to receive the wooden rails upon which the iron plate cross-ties of timber secured the rails from spreading. The remainder of the road was laid upon longitudinal sills, upon which the sleepers rested; notched on both sides to secure the sills in their place, and also to receive the wood rail upon which rested the iron plate as in the first part of the road. It had a single track with turnouts. The road was comparatively low; in no case exceeding sixteen feet grade to the mile. "Steam power was used to good advantage," and the net increase in the earnings of the road from April 1, 1833, to February, 1834, was about ten per cent. on the capital stock.

CHAPTER IV

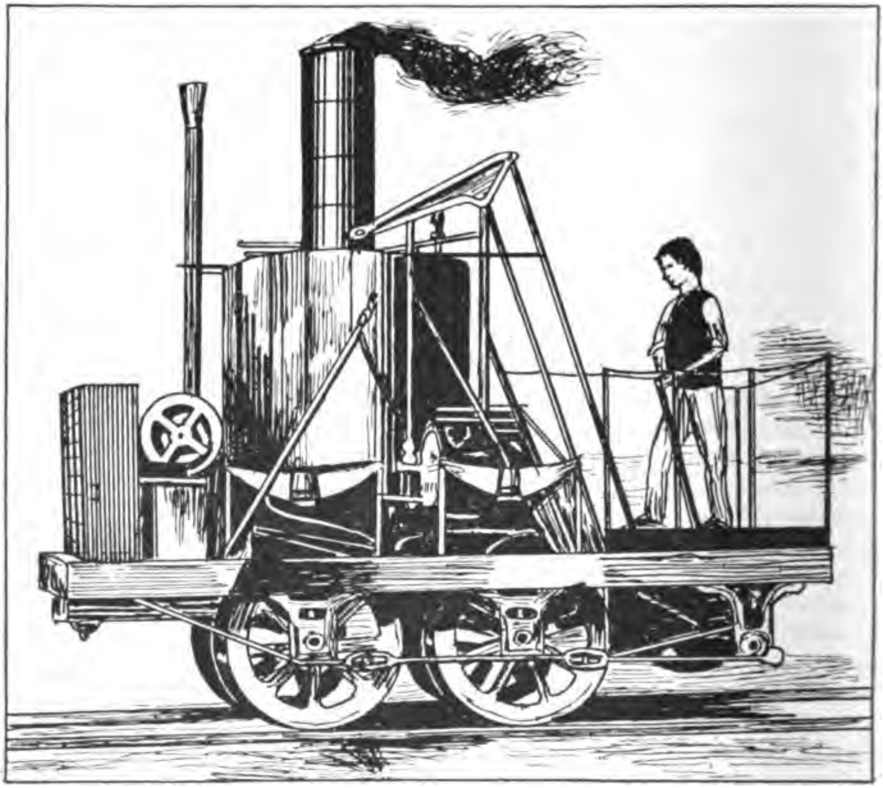
RENSSELAER AND SARATOGA RAILROAD; SARATOGA AND WASHINGTON R. R.; AUBURN AND SYRACUSE R. R.; SYRACUSE AND UTICA R. R.; OSWEGO AND SYRACUSE R. R.; TROY AND GREENBUSH R. R.; WATERTOWN AND ROME R. R.; NEW YORK AND ALBANY AND NEW YORK AND HARLEM R. R.; ALBANY AND WEST STOCKBRIDGE (MASS.) R. R.

RENSSELAER AND SARATOGA RAILROAD

This road was chartered April 14, 1832. The articles of incorporation named as the first directors John Cramer, Elisha Tibbets, John Knickerbacker, Richard P. Hart, Townsend McCann, Nathan Warren, Stephen Warren, LeGrand Cannon, George Vail, Moses Williams, John P. Cashin and John Paine. John Knickerbacker and John House, of Waterford; Stephen Warren, William Pierce, William Haight, James Cook and Joel Lee, of Ballston Spa, were designated as commissioners to open the books of subscription. Work was commenced the following year, and on October 6, 1835, the first passenger train north bound, left Troy. The northern terminus of the road near the present depot in Ballston Spa.

While this road extended as far north as Ballston Spa, only the Schenectady and Saratoga Railroad had been built as far north as Saratoga Springs; the latter road thereby receiving a majority of the traffic between Saratoga Springs and Ballston Spa. As soon as the Rensselaer and Saratoga Railroad had been completed, an agreement was entered into with the other road whereby the passengers and traffic of the Rensselaer and Saratoga Road might be carried on north of Ballston Spa over the tracks of the Saratoga road.

This road finally went into the hands of the creditors, and was purchased by a new organization, which raised the capital stock to $600,000, and later to $800,000. In June, 1860, it leased the Saratoga and Schenectady and the Albany and Vermont Railroads. All these with other additions subsequently passed into the possession of the Delaware and Hudson Canal Co.



GRASSHOPPER TYPE OF LOCOMOTIVE, 1832

THE SARATOGA AND WASHINGTON RAILROAD COMPANY

This company was chartered May 2, 1834, with a capital of $600,000, but the company was not fully organized until April 20, 1835. The work of construction was at once begun, and over $60,000 expended, when it was stopped until 1838. The time was extended to April 13, 1840; again to May 6, 1844; then to April 4, 1850; and the capital stock was increased to $850,000 April 7, 1847. April 7, 1848, the company was granted permission to extend the road east to Vermont. Upon resuming work a route was in part adopted, and the work of laying rails begun April 16, 1848. On August 15th of that year the road was opened from Saratoga Springs to Gansevoort; Dec. 10, 1848, it was opened to Whitehall, and April 9, 1851, to Lake Station a mile and three-quarters beyond Whitehall Junction. The road was sold Feb. 27, 1855, on foreclosure of second mortgage, and the name changed to

SARATOGA AND WHITEHALL RAILROAD

The new company was organized June 8, 1855, with a capital stock of $300,000. It ran from Saratoga Springs to Castleton, Vermont, fifty-two and a half miles. It became the successor of the Saratoga and Fort Edward Railroad, which was incorporated April 17, 1832, with a capital of $200,000 to construct a road from Saratoga Springs to Fort Edward, seventeen miles. By the act of May 2, 1834, nothing in the meantime having been done toward the building of the road, the surveys, maps, etc., were allowed to be sold to the Saratoga and Washington Railroad Company.

The Schenectady and Troy Railroad was incorporated May 21, 1837. The stock was divided into five hundred shares at one hundred dollars each. The building of the road began in 1841, and trains began running to Troy in the fall of 1841. It was constructed by the city of Troy, the corporation issuing its bonds to the amount of $649,142.

AUBURN AND SYRACUSE RAILROAD

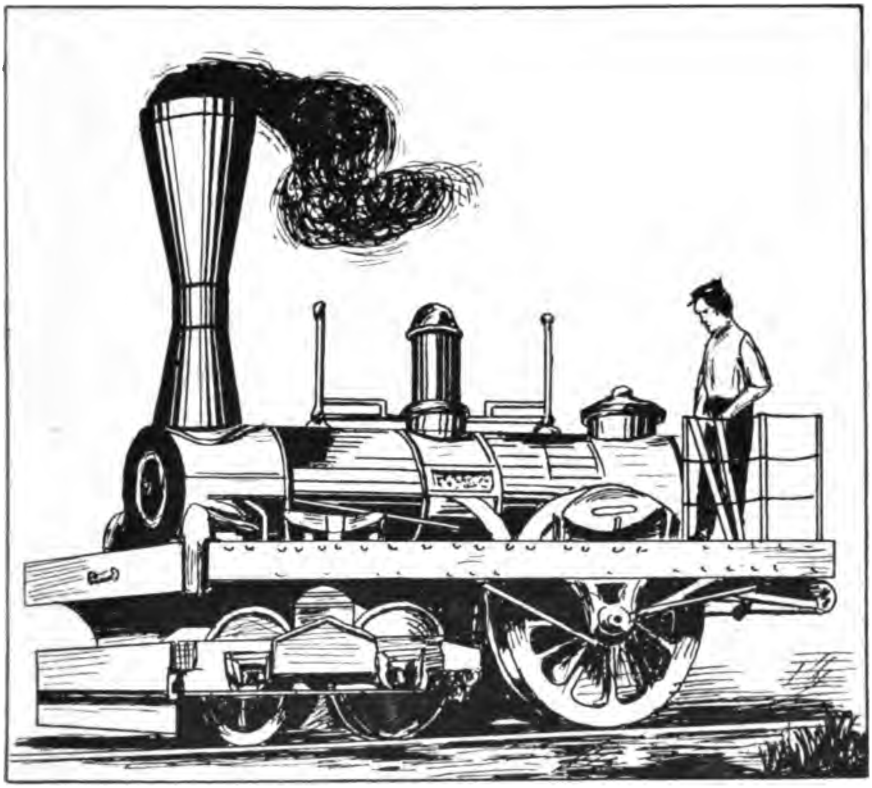
This company was incorporated by act of the Legislature passed May 1, 1834. Daniel Sennett, Ulysses F. Doubleday, Bradley Tuttle, Daniel Munroe, Grover Lawrence and William Lawrence, Jr., were the original incorporators, with power "to construct a single or double railroad between the villages of Auburn and Syracuse, on such route as a majority of the directors of said company might determine." The capital of the company was placed at $400,000. The law required that $20,000 should be expended in the construction within two years after the passage of the act, and that the road should be completed and in operation within five years thereafter, otherwise the corporation should cease to exist and the charter become null and void. Hon. Elijah Miller was the first president.

Work was commenced in December, 1835, and the first payment to contractors was made in January, 1836. On April 4, 1837, an act was passed authorizing the Commissioners of the Land Office to sell and convey to the company such portion of "farm Lot No. 253, of the Onondago Salt Springs. Reservation to the town of Saline lying between the Canal and the streets across said lot as may be necessary for the track of said road upon said land for a depot, and for the construction of a basin for the accommodation of said company."

The road was opened from Auburn to Geddes with wooden rails, June 8, 1838, at which date Sherwood's stage horses were put upon the line between Auburn and Geddes, and continued to draw the cars till June 4, 1839, when the "iron horse" was put on in their place. On that day the first engine ran on the road; the "Syracuse" was connected with the train, and an excursion was made over the entire road, and brought into the city, the bridge across the mill pond having been completed in the spring of 1839.

SYRACUSE AND UTICA RAILROAD

This road was chartered May 11, 1836, and was entitled "An act for the construction of a railroad from Syracuse to Utica." The Company was required by law to pay the President and Directors of the Seneca Railroad the amount of damages which the said railroad company might sustain by the construction of the railroad, and also to pay toll to the Canal Commissioners on all freight other than the regular baggage of passengers carried by the railroad during the season of canal navigation. The Schenectady and Utica Railroad Company was absolutely prohibited in its original charter from carrying any freight. This prohibition was removed by act of March 7, 1844, and the above named road was allowed to carry freight during the suspension of canal navigation by paying the Canal Commissioners such tolls as would have been paid on the goods had they been transported by the Erie Canal. This opened all the roads to freight through to Buffalo subject to the same conditions as those imposed upon the Schenectady and Utica Railroad. The road was formally opened in 1839.



LOCOMOTIVE, 1837

The line from Syracuse to Rochester composed of the Auburn and Syracuse, and the Auburn and Rochester Railroads, was 104 miles over a crooked route with heavy grades. In 1849 the attention of Mr. John Wilkinson and others was called to the necessity of constructing a more direct route and level railroad between Syracuse and Rochester; and with that object in view they organized the Rochester and Syracuse Direct Railroad Company. The surveys were made by O. Childs, and showed that a level railroad could be constructed twenty-two miles shorter than the old line. In 1850 three companies consolidated under the name of the Rochester and Syracuse Railroad Company, and the Direct Road was built in the ensuing year under the direction of James Hall, engineer, and opened in 1853, at the same time of the grand consolidation, forming the New York Central Railroad.

Oswego and Syracuse Railroad

This Company was formed April 29, 1839, and the route was surveyed during the summer of that year. The Company was fully organized March 25, 1847. The road was opened in October, 1848, thirty-five miles and a half in length. In 1872 it passed under the management of the Delaware, Lackawanna and Western Railroad Company.

Troy and Greenbush Railroad

This Company was incorporated May 11, 1845, and organized May 14, under a lease from the New York and Albany Railway Company. According to the charter the road extended from Washington street, in Troy, to where it intersected the track of the Schenectady and Troy Railroad, to Greenbush, where it connected with the track of the Albany and West Stockbridge Railroad. On its completion trains were drawn by locomotives up through River street to the intersection of King and River streets, Troy, where the depot was situated. On January 1, 1851, the road was leased to the New York and Troy Railroad Company. This was subsequently leased to the Hudson River Railroad for seven per cent. on $275,000 its capital stock.

Watertown and Rome Railroad

This Company was formed April 17, 1852. It was clothed with powers to build a road from Rome to Watertown, and thence to the St. Lawrence, or Lake Ontario, or both, with a capital of

$1,000,000 in shares of one hundred dollars. Work was to commence within three, and end within five years.

In April, 1852, just twenty years after the formation of the company, the railroad was completed and put in operation from Watertown to Cape Vincent, twenty-five miles. The total length of the entire line was seventy-seven and a half miles, and its total cost $1,957,992. The road is now known as the Rome, Watertown and Ogdensburg Railway.

THE NEW YORK AND ALBANY AND THE NEW YORK AND HARLEM RAILROAD

The first road projected between New York and Albany was known as the New York and Albany Railroad. This was incorporated by act of the Legislature, April 17th, 1832, authorizing the construction of a road, commencing at the termination of Fourth avenue, New York City, and extending along the line of the Hudson River to the city of Albany.

The Company not being able to avail itself of its privilege, "after six years of vicissitudes and vain efforts," surrendered its rights in Westchester county to the New York and Harlem Railroad which was incorporated the year previous. The Legislature in May, 1840, affirmed the compact between the two companies, empowering the Harlem Company to construct a bridge over the Harlem River, and a railroad through Westchester county to an intersection with the New York and Albany's line of road, which would be at the southern boundary of Putnam county. The first portion of the road which it was determined to build was as far up as White Plains. The question was raised as to the ability of Westchester county to support a railroad. A careful estimate was made as to the prospective income from the enterprise. It was estimated that $47,788 would be received from the passengers, and $60,980 from freight, or a total of $108,768, which it is said would fully meet all expectations and yield a profit of at least *twenty-five per cent.* on the capital invested. Another engineer estimated upon an immediate income of $60,000, of which amount $950.00 would come from the Catholic School at Fordham and Powell School at Westchester. Another gave it as his belief that the town of East Chester "will contribute along with Ram's Marbel Quarry $15,000; and six other towns of Westchester county $10,000 to support a railroad." Among those paricularly interested in this new enterprise was Governeur Morris, who had been so very active in promoting the New York and Erie Canal.

The "estimates" of the prospective income from Westchester county were doubtless satisfactory; for the road was constructed to Fordham in 1841; to Williams Bridge in 1842; to Tuckahoe, July, 1841; and to White Plains the same year, passing through the towns of Morrisania, West Farms, Yonkers, East Chester, Scarsdale, Greenberg and White Plains. The company reported in 1846, that the cost of construction of six miles of road from the south side of Harlem River Bridge to Williams Bridge was $38,475 per mile, while its thirteen miles of road from Williams Bridge only cost $11,177 per mile.

The road was formally opened to Croton Falls in June, 1847, and passed through the towns of White Plains, Mount Pleasant, New Castle, Bedford, Lewisboro and North Castle, and through, it is said, ninety-seven farms.

The original capital of the company was $350,000, which, in 1832, was increased to $500,000, with a stipulation that the road should be completed to the Harlem River in 1835. Although this was not done, the Legislature in the latter year authorized the company to increase the capital to $750,000; to borrow $400,000; and in 1839 to convert the bonds into stock. When the extension through Westchester county was begun, the capital had been increased to $1,950,000; and still another increase of $1,000,000 was needed to carry the road through the county. When the line was completed to Chatham Four Corners, in January, 1852, it had cost $7,918,118, and its liabilities were over $11,000,000. At Chatham Four Corners it connected with the Albany and West Stockbridge Railroad.

William T. Jones, of New York, who had already constructed a steam carriage in 1829, finished a locomotive in 1832, which was the first one used by the Harlem Railroad. This was sold to the Baltimore and Ohio Railroad, and exploded in 1834. This was provided with a "spark arrester."

ALBANY AND WEST STOCKBRIDGE RAILROAD

This was formerly known as the Castleton and West Stockbridge Railroad. The Company was organized April 9, 1830, but nothing was done under the first name. The name of Albany and West Stockbridge Railroad was assumed May 5, 1836. The road was opened from Greenbush to Chatham, December 21, 1841, and to the State Line, September 12, 1842. It was leased to the Western (Mass.) Railroad, Nov. 18, 1841, for the term of its charter, and later was operated as a part of that road, including the ferry at Albany. The city of Albany at different times issued bonds for $1,000,000 to aid in building the road, the lessees paying the interest and $10,000 annually toward the sinking fund. It connected at Albany with Springfield and Boston.

CHAPTER V

THE NEW YORK AND ERIE RAILROAD

The conception plan of the New York and Erie Railroad, which originated with Governor DeWitt Clinton, was the earliest of all railroad projects in the State of New York, its construction, however, which began a few years later, is due probably to Mr. Eleazer Lord, more than to any other man. Mr. Lord was a man of varied accomplishments and a recognized authority on finance.

Mr. Lord enjoyed intimate relations with Governor Clinton, and while on an excursion to Ohio with him in 1825, Governor Clinton repeatedly alluded to events in the history of the Erie Canal, and to the deep interest which he had long felt on the subject of an avenue from New York to Lake Erie through the southern tier of counties. His father, Gen. James Clinton, with Gen. Sullivan, as far back as 1779, after an expedition against the Indians on the Chemung and Susquehannah Rivers, had recommended and applied to Congress to authorize and to assist in the construction of an "Appian Way" through those counties. Governor Clinton inherited his father's zeal upon the subject, and on the passage of the Act in 1817, authorizing the Erie Canal, he gave assurance to those counties that on their co-operation in the construction and completion of the canal, an avenue as nearly equivalent as possible through the southern tier of counties from the Hudson to Lake Erie, should be constructed at the expense or with the aid of the State.

To redeem this pledge he called the attention of the State Legislature to the subject in 1824, and recommended a survey for a State road over the route in question. A survey was made and repeated in March, 1825, but it was of a character to discourage all further effort.

Mr. Lord listened to Governor Clinton's views, became interested, enlisted, and committed himself to assist in carrying forward the project. In October, 1826, a convention of delegates met at Newburgh to devise a plan of proceedings, and called a meeting in New York, at which the Mayor presided. William Paulding, Garret Storms, Pierre Van Wyck, Peter Sharp, Samuel St. John. Henry Wyckoff and Mr. Lord were appointed delegates, all of whom attended the convention, reviewed all the previous proceedings, recommended certain measures, published a report and an address to the Legislature, and appointed committees of correspondence in the counties. Mr. Lord's office being the headquarters.

Attention was soon turned to the question of a canal over the entire route, pamphlets were published, surveys of parts of the line were made, attention was aroused and confidence inspired. The subject of railways began to be talked of. In 1828 other projects were abandoned and attention turned to that of a railway; but the sudden death of Governor Clinton during the session of the Legislature that year, checked and postponed their action for some time. In 1829 a pamphlet recommending a railway over the whole route was published and widely circulated. In 1831, on application to the topographical bureau at Washington, Colonel DeWitt Clinton of the Engineer Corps, son of the Governor, was detailed to conduct an experimental survey of the route, which he pronounced practicable and for the most part very favorable.

In the autumn of 1831, Mr. Lord published a notice of application to the Legislature at its approaching session, for an Act incorporating "The New York and Erie Railroad," to construct a railway from the city of New York through the southern tier of counties to Lake Erie, with a capital of $10,000,000, to be organized when half a million dollars was subscribed. A charter was drawn up by the Hon. John Duer, which was passed in April, 1832, with such amendment, however, as marked the hostility of the central parts of the State, and of the then prosperous population on the route of the canal. By these amendments eighty commissioners were appointed from different parts of the State, and the whole $10,000,000 were to be subscribed prior to an organization.

The incorporators named in this charter were:

Samuel Swartwout
Stephen Whitney
Peter White
Cornelius Harsen
Eleazer Lord
Daniel Le Roy
William C. Redfield
Cornelius J. Blauvelt
Jeremiah H. Pierson
William Townsend
Egbert Jansen

John Arnott
John Magee
William McCoy
William S. Hubbell
William Bouman
Arthur H. Erwin
Henry Brother
Philip Church
Samuel King
Walter Bowne
Morgan Lewis

Charles Borland
Abram M. Smith
Alpheus Dimmick
Randall S. Street
John P. Jones
Joseph Curtis
George D. Wickham
John L. Gorham
Joshua Whitney
Christopher Eldridge
James McKinney
James Pumpelly
Chas. Pumpelly
John R. Drake
Jonathan Platt
Luther Gere
Francis A. Bloodgood
Jeremiah S. Beebe
Ebenezer Mack
Ansell St John
Andrew DeWitt Bruyn
Stephen Tuttle
Lyman Covell
Robert Covell
William Paulding
Peter Lorillard
Isaac Lawrence
Jeromus Johnson
John Steward, Jr.
Henry L. Wyckoff
Richard M. Laurence
Gideon Lee
John P. Stagg
Nathaniel Weed
Hobart Van Wagener
David Rogers
John Hone
John G. Coster
Goold Hoyt
Peter L. Nevius
Robert Bulord
Thomas R. Ronalds
John Haggerty
Elisha Riggs
Benjamin L. Swan
Grant B. Baldwin
William Maxwell
Darius Bentley

These incorporators comprised prominent business men and financiers of New York and of the several counties in the State who were interested in this railroad enterprise. The charter provided for the construction of a double, single, or three track railroad from New York, or some point near New York, through the Southern Tier, by way of Owego, to Lake Erie, the building of the road to be commenced within four years, and $200,000 expended in construction within one year thereafter, one-quarter of the railroad to be completed and in operation within ten years from the date of the charter, one-half within fifteen years, and the whole within twenty years, the penalty for failure to comply with these conditions rendering the charter null and void.

The meeting for the final report of these Commissioners was held at the Merchant's Exchange, New York, July 19, 1835, when the first Board of Directors were elected. These were Stephen Whitney, Peter Harmony, John Duer, Goold Hoyt, James Bowman, William C. Buckner, Elihu Townsend, Michael Burnham, *Eleazer Lord, Jeremiah H. Pierson,* Samuel B. Ruggles, Benjamin Wright, D. N. Lord, of New York; Cornelius J. Blauvelt, of Rockland county; George D. Wickham, of Orange county;

Joshua Whitney, of Brown county; James Pumpelly, of Tioga county.

Eleazer Lord was elected the first President of the Company, Goold Hoyt, Vice President, William G. Buckner, Treasurer, and John Duer Counsel.

In the preceding year application was made by Mr. Lord to the President of the United States for a survey by the Engineer Corps which was in part complied with. Colonel Clinton was detailed to make a partial survey which he did through Rockland, Orange and Sullivan counties, the expense being met by contributions in those counties.

At Mr. Lord's suggestion it was agreed before expending any of the capital subscribed, that a committee, of which he was chairman, should solicit from the people along the route donations of land for the roadway, and from large proprietors, donations of land to the company, and also to apply to the Legislature for pecuniary aid for a thorough survey. Grants were made for the road on a large portion of the line; 50,000 acres of land from the purchasers of the Holland Land Company's land; 2,000 acres from the purchasers of land in Dunkirk; and various smaller donations, all conditional that the road should be constructed within a period which proved too short; the whole of which were valued at not less than $2,000,000. At the beginning of 1834 the Legislature granted $15,000 for a survey. The Governor appointed Judge Benjamin Wright Chief Engineer to survey the route; he was assisted by James Seymour and Charles Ellett; the survey was begun May 23d and finished the same year.

The company was now in a condition to solicit subscriptions and begin the construction of the road. Mr. Lord, who had already spent some ten years in the prosecution of this great enterprise and been at great personal expense, was anxious to withdraw and leave the execution of the work to others.

He therefore proposed to the leading merchants in New York city to resign and relinquish the entire affair to them free of charge on condition that they would subscribe the necessary capital to prosecute the work. Mr. Lord's proposition was accepted, and the necessary arrangements and changes were made in February, 1835. The Company was reorganized and Mr. James G. King became its President. Owing to Mr. Lord's long experience in this enterprise his counsel and assistance were greatly desired by the new company, and he therefore consented to accept the position of Treasurer. Application was made to the Legislature for a loan; this, however, was not granted at the time for the reason that the company had not up to that time expended anything. Books for subscriptions were opened in April and the capital increased to $2,382,100.

An amendment to the charter was passed, authorizing the directors to commence work at any point on the interior of the line, and 40 miles on the Delaware River were located and placed under contract. Mr. Lord remonstrated strongly against this step, urging as a reason that it was impolitic, and that they would in all probability lose the confidence of the stockholders, and the project would result in failure. Subsequent events proved the wisdom of his conclusions. He determined to sever his connection with the company and at once resigned his position as Director and Treasurer. Messrs. Gould Hoyt and Elisha Townsend, two of his associates who held the same views which he did also resigned.

Near the close of 1836 the company was compelled to suspend operations on the Delaware section, and the work was not again resumed, the stockholders having lost confidence in the wisdom and judgment of their representatives. In December an instalment of two and a half dollars on the stock was called for, to settle the contracts which was paid on less than half the shares subscribed. In 1836 a loan of $3,000,000 was granted by the State and the Comptroller directed to issue State stock for this amount to aid in constructing the road, but with such conditions thereto that no part of it was available. Near the close of December many of the stockholders became embarrassed as the result of a fire which occurred in the business portion of the city, and found it difficult to meet their obligations. The Board of Directors made no allowance for these misfortunes, and at the election in October, 1837, refused the votes of those stockholders who had not paid up their instalments, so as to prevent others from being elected, and finally determined to abandon the undertaking unless the Legislature would adopt means for immediate relief.

At the session of 1838 Mr. Lord went to Albany for the purpose of obtaining or inducing the Legislature to adopt some measure for affording the needed relief. A bill was passed authorizing an issue of $100,000 of the State loan against a corresponding amount raised by the company; on condition, however, that the company should first place under contract ten miles of the road from Piermont west, and ten miles from Dunkirk east, immediately after which, on the earnest solicitation of the Board a new board was elected.

The new Board consisted of the following:

James G. King, Peter C. Stuyvesant, George Griswold, David N. Lord, Jeremiah H. Pierson, Samuel B. Ruggles, Stephen Whitney, James Bowman, Aaron Clark, George S. Robbins, Charles Hoyt, John A. Stevens, John G. Coster, John W. Leavitt, Geo. D. Wickham, William Beach Lawrence.

George S. Robbins resigned from the Board April 27, 1838, and Eleazer Lord was chosen to fill the vacancy. The bill formulated by Mr. Lord was passed by the Legislature in April, 1838, and Samuel Allen, of Syracuse, was appointed by the Board of Directors General Commissioner of the Company "to procure deeds of cession and donations of land to the Company."

The contracts for ten miles each at the two given points stipulated were given out and soon after this Mr. Lord proposed to the Board that new subscriptions be obtained from Rockland and Orange counties of sufficient amount, with a corresponding sum of the State loan to construct the road from the west end of the ten miles then under contract in Rockland county, a distance of thirty-six miles, and to make contracts which should be suspended if the required instalments were not duly paid. The company were to issue special certificates for the stock, entitling the holders to interest on it, out of the earnings of this part of the road when put in use, until the entire road should be completed to the Lake. This was agreed to, and Mr. Lord was empowered as Commissioner to carry it into effect; and soon after to carry it several miles further to Middletown. This plan proved successful; the road was completed and opened for use in 1841.

Confidence was at once restored; Mr. King resigned, and with his friends withdrew from the Board, and Mr. Lord was re-elected President Oct. 3, 1839. In February following, having obtained subscriptions on the same conditions as in Rockland, 117 miles, from Binghampton to Hornellsville, were placed under contract and work commenced. The Legislature of 1840 authorized an advance of $100,000, against every sum of $50,000 collected on the stock.

Similar contracts were made for the construction of the road from Middletown over the Shawangunk Ridge and along the east side of the Delaware River to Deposit, and for 124 miles from Hornellsville west to the ten miles before mentioned, from Dunkirk east. Thus the whole road was contracted for and in progress, except about 40 miles between Deposit and Binghampton without a dollar from the original stockholders in New York, or any corporation, or sympathy from the citizens. Within a period of twelve months this great enterprise had undergone a complete change, from approximate bankruptcy to a sound financial basis, with confidence and credit restored.

Several changes in the management of the Company's affairs took place in 1809. Mr. King resigned as President September 25th, and Elihu Townsend was elected President *pro tem.* At the annual meeting held in October following Mr. Eleazer Lord was again elected President, with the following Board of Directors:

Jeremiah H. Pierson, George Griswold, Aaron Clark, Charles Hoyt, Henry L. Pierson, William H. Townsend, John A. Stevens, Eleazer Lord, Elihu Townsend, John A. King, George S. Robbins, Isaac L. Varian, Geo. D. Wickham, Stephen Whitney, David N. Lord, Wm. Beach Lawrence, James Bowen.

Enemies of the road sought by every means in their power to create distrust and embarrass the company. In order to counteract these efforts to impair the credit of the company, Mr. Lord, at the beginning of the session of 1841, addressed a communication to the Speaker of the House requesting the appointment of a Committee of Investigation to inquire into the affairs of the Company. After an exhaustive examination of the books and the company's methods of doing business the committee in their report stated that: "The result of our investigation not only exonerates the company, its affairs and agents from everything like a charge of fraud or mismanagement, or attempt to evade the law, but proves on the contrary that they are justly entitled to the confidence which the Legislature has heretofore reposed in them. Instead of being liable to censure, the company is entitled to approbation. The committee is constrained to say that this company deserves the encouragement and liberal support of the Legislature (Assembly Doc. 284 of 1841). The committee occupied nearly six months in their investigation, and their report covered an octavo volume of nearly 700 pages. In conclusion they recommended "that the Legislature should encourage the prosecution of the work by the company under its then existing organization."

Prior to the investigation of the first committee Mr. Lord had determined to resign from the company, believing its condition to be safe, and that the whole line would be carried through without further interruption. Before taking this step, however, he proposed a compromise by which the relations of the original stockholders, many of whom had been ruined by the destructive fire of 1835, and none of whom had paid anything since 1836, might be adjusted, viz.: that by paying the further sum of $5 per share on their stock they should be entitled to relinquish to the company the original scrip, and receive full certificates of stock for the amount of all payments made, and a release from all liability under any outstanding contracts. This was agreed to; the contractors assembled, and a clause was added to all contracts exempting them from further liability. With these improved conditions and brighter prospects Mr. Lord, feeling justified in severing his connection with the company, again resigned on May 28th, 1841.

Up to this time eleven only out of thirty instalments of $100,000 each of the State loan had been received. Mr. James Bowen was appointed President, and the company's affairs seemed prosperous for the next few months; but new complications arose, being unable to pay the interest due on April 1st, 1842, and with an indebtedness of $600,000 it was compelled to make an assignment, and all work was suspended for the time being.

At the annual meeting in 1843 new directors were elected, most of them New York business men. Mr. Horatio Allen, a professional engineer, was chosen President. A report was made February 2d, 1844, showing that the company had expended for surveys, right of way and construction, $4,000,000; that the money had been used with economy and good judgment; that the work was well done, and that more than half of the entire line was completed; that to complete the road of 451 miles, from Piermont to Dunkirk, would require an additional outlay of $6,000,000, making the capital $10,000.000. A call was made for additional subscriptions covering this amount; failing to secure it the Board of Directors abandoned the affairs of the company at the close of their official year.

Mr. Lord was again appealed to by the stockholders to aid them in carrying forward this great enterprise, and at the annual meeting, October 23d, 1844, a new board, composed mostly of New York merchants, was elected, and Mr. Lord was again made President. He immediately issued an address concerning the existing difficulties, the nature and sources of hostility on the one hand, and of apathy on the other, and proposed to resume the work on a section of the road in compliance with a law providing that if the work was resumed within two years the road should not be sold by the State within five years following.

This assurance inspired confidence and work on the road was resumed; but new difficulties arose as the result of former mismanagement, and Mr. Lord, weary of bearing the burden longer and assuming new responsibilities finally, against the earnest protests of his associates, resigned the presidency, July 8th, 1845.

A report was made by Mr. Horatio Allen a professional engineer, Feb. 2, 1844, showing that the company had expended for surveys, right of way and construction $4,000,000; that the work was all well done, and with economy, and that *more than half* *of the whole line was at this time completed,* and that for finishing the entire line, equipping and putting in use 451 miles from Piermont to Dunkirk, would require six millions, making the capital $10,000,000. They issued a card calling for subscriptions for this amount, but they were unable to raise it, and abandoned the road at the close of their official year.

The first Erie road was built in patches, just enough here and there to comply with the requirements of the statute authorizing it; that the money the State was to supply might be handled. It was built on piles, and these were observable here and there for many years afterward. It was not the purpose to grade up to the rails, but to lay them on top of the piles; the unevenness of the country being provided for by the piles themselves; their tops being level, however much or little they might be driven into the ground.

Starting from Piermont, on the Hudson River, twenty miles above New York City, it reached Otisville, sixty-two miles, in October, 1840. The route was altered, and reached Binghampton, one hundred and thirty-nine miles, in December, 1848, at a cost of $9,802,433, allowing $1,458,000 for half the old stock, after the release of the State lien. In June, 1849, twenty-two miles more to Owego, were opened. In October, thirty-six and a half miles were added to Elmira, and it finally reached the lake at Dunkirk, May, 1851. This was a single track and it was found almost impossible to work it; consequently they laid a second track under contract on portions of the road.

It was found that the location of the road at Piermont to be reached by steamboat would not answer. The company then made arrangements with the Paterson and Ramapo Road to allow the Erie to come into Jersey City. The Erie Railroad being a wide guage, six feet, and the Paterson Road four feet eight inches, it became necessary to lay another rail outside the track to permit the Erie cars to come over those roads; and the Erie cars reached Jersey City in November, 1853. The whole road as then completed was four hundred and sixty-five miles; eighty-one miles of double track and sidings. The maximum grade of the road is sixty feet to the mile for eight miles, and there is one of fifty-seven feet to the mile. The cost of the road was greatly enhanced by the mode of raising money for its construction by a constant series of loans, for which were issued first mortgage bonds, and second mortgage bonds, convertible into stock. By this means the debts of the company ran up to $26,260,000, and the capital of $10,000,000 was in February, 1857, by a dividend of ten per cent. in stock, money alleged to have been carried and sunk in the Long Dock, raised to the sum of $11,000,000.

In 1845 the State released its lien on the road, and authorized the original stockholders to surrender two shares of old stock and receive one share of new. On April 8, 1845, a branch was allowed to be built from Chester to Newburgh, 19 miles. The different portions of the road as completed, were opened as follows: From Piermont to Goshen, Sept. 22, 1841; to Middletown, June 7, 1843; to Port Jervis, Jan. 6, 1848; to Binghampton, Dec. 28, 1848; to Owego, June 1, 1849; to Elmira, Oct., 1849; to Corning, Jan. 1, 1850; and to Dunkirk, May 14, 1851. The Newburgh Branch opened Jan. 8, 1850. The road was compelled to pay a bonus of $10,000 annually to the State of Pennsylvania for the privilege of passing through a short distance in that State.

The company connected with Jersey City over the track of the New Jersey Transportation Company, but it projected an independent connection through what is called Long Dock. This embraced a tunnel of two and a half miles through Bergen ridge, and two and a quarter miles of road running out to the dock and piers, built out to deep water.

The road was opened to Dunkirk May 14, 1858, and the event was signalized by the passage of the President of the United States and his cabinet, with several prominent members of Congress, from one terminus to the other. Among those present who took part in the exercises were President Fillmore, Daniel Webster and Stephen A. Douglass.

A history of the Erie R. R. (1895) says:

"Leaving the Hudson at Jersey City or Piermont, it passes across Rockland and Orange counties to the Delaware River, which it strikes at Delaware Station. The boldest scenery on the road is in the next ninety miles in which the road follows the winding banks of this river. It then crosses the summit to the Susquehannah, and continues through the southern tier of counties to Lake Erie.

"The length of the road as now run from Jersey City is 459 1-2 miles. As may be imagined it requires an army of men to take care of its numerous affairs, and the labor on the line. Some idea of the magnitude of its affairs may be gathered from the following facts which refer to the state of the road in the year ending September 30, 1854.

Number of engineers, 183.
Number of cars, 2,935.
Miles run by the engineers, 2,963,484.
Average miles run by each engineer, 16,194.
Average miles run each day, 8,119.

Tons of freight carried in cars, 743,250.

Or an amount equal to 130,808,034 tons carried one mile.

Number of passengers carried, 1,125,123.

Length of road, main line, 445 miles.

Newberg branch, 19 miles.

Double track, 262 miles.

Total miles railroad, 726 miles.

Cost of road and equipment, $33,439,431, or about $46,000 per mile.

Earnings for year 1854, $5,359,958.63.

Expenses, $2,742,615.57, or 51.16 per cent. of the earnings.

Number of employees, about 4,000.

Susquehannah shop, 203.

Piermont, 230.

Dunkirk, 115.

Car repairers, 134.

Total number of employees, 4,682.

An interesting contribution to the History of the Erie Railroad Company is found in the family records and business operations of the Piersons, of Ramapo, in Rockland county, N. Y.

Jeremiah Halsey Pierson, who with his brother Isaac Pierson, founded the extensive Ramapo works, was among the first to appreciate the importance of a great internal highway, connecting the cities of New York and Albany. He constructed that part of the road which passes through Ramapo, known as Section 21, and in his report that he had completed it in August, 1841, and on the 23d of September of that year the first passenger train came as far as Ramapo. His interest in that great enterprise continued unabated till his death. His only daughter, Elizabeth, was married to Eleazer Lord, the first President and chief promoter of the Erie Railroad. This brought the two men into closer relationship, and both men worked assiduously and unceasingly to carry forward this great enterprise. The practical mechanical knowledge of Mr. Pierson, obtained by long experience was of great benefit to Mr. Lord, who consulted with him on all matters of importance concerning the interests of the road.

One of the New York papers, in its account of the death of George B. Pierson, said:

"More than a century ago Jeremiah H. Pierson, grandfather of George B. Pierson bought several thousand acres of land in the Ramapo Valley, which was then a wilderness. Utilizing the water-power of the Ramapo River, he established an ironworks, a cotton mill and a nail factory. The first cut nails ever made were manufactured at the Pierson works, the machinery neces-

Jerh. H. Pierson

sary for their manufacture being an invention of Jeremiah H. Pierson's brother, Josiah G. Pierson. Previous to that nails were forged under the hammer. The iron used in the works was imported from Russia, and largely paid for in the products of the Pierson cotton mill at Ramapo works.

Josiah Gilbert Pierson, brother of Jeremiah H., was the inventor of the machinery for making the first cut nails ever used in this country, and by this means materially reducing the cost of manufacture and increasing the product to an unlimted extent, effecting in a marked degree the building and other industries depending on this one article of manufacture. Previous to this all the nails used were forged by hand under the hammer, and the labor of hundreds of mechanics was required to produce the output of a single machine. It is no exaggeration to say that hundreds of millions of dollars have been saved to the country by this labor-saving invention.

"Eleazer Lord, in his day one of the most conspicuous of New York business men and financiers, married a daughter of Jeremiah H. Pierson. He was a pioneer in the agitation for better means of communication and transportation between tidewater and the Great Lakes, particularly through the southern tier of New York counties. The Erie Canal then provided no outlet for that part of the State, save by long hauls by wagon to shipping points on the waterway.

A railroad was Mr. Lord's suggestion. It was a bold one; for there were as yet no railroads in operation anywhere, the pioneer Baltimore & Ohio being then only in a crude stage. Locomotive power was an untried and ridiculed proposition, and Eleazer Lord's idea of a railroad from the Hudson River to the shore of Lake Erie, to be operated by horses and inclined planes was treated as worthy only of an insane man.

Henry L. Pierson, son of Jeremiah H. Pierson, was married December 30th, 1830, and visited Charleston, S. C., on his wedding trip. A railroad was then in course of construction between Charleston and Hamburg, in that State, the opening of the few miles then finished of the Baltimore & Ohio, having demonstrated the practicability of that method of transportation.

Work on the South Carolina Railroad had progressed so far in December, 1830, that six miles of it were ready for operations. The opening ceremonies were set for the very day that the Piersons got into Charleston, and that occasion was to become historic as the day on which a locomotive in active service was, for the first time in America, to haul a trainload of passengers.

On that pioneer locomotive-drawn passenger train, Henry L. Pierson (son of Jeremiah H. Pierson, and brother-in-law of

Eleazer Lord) and his wife were passengers; thus, undoubtedly, having the distinction of being the first bridal couple to include a railroad trip as a part of their wedding tour. Mr. Pierson had been impressed years before with the ideas of his brother-in-law, Eleazer Lord, regarding the building of a road through New York State. This trip of Henry L. Pierson behind a locomotive on a railroad in far away South Carolina, however, convinced him that the question of motive power on railroads was settled beyond all question. He returned North enthusiastic over the subject, bringing here the first news of the wonderful railroad opening at Charlestown. His report aroused Eleazer Lord to renewed enthusiasm over his projected road, and the result of his efforts toward carrying out the plant of such road was the chartering by the State of New York of the New York & Erie Railroad Company in the spring of 1831, authorized to build a railroad from the Hudson River, near New York, to the shores of Lake Erie.

"Eleazer Lord was the first President of that company, which is now the Erie Railroad, whose 2,000 mile system grew out of the original 47 miles built under Eleazer Lord, and opened for business after years of struggle ond vicissitudes. The vital inspiration came from Henry L. Pierson's bridal trip on the pioneer locomotive railroad of America, at Charleston, S. C.

"Henry L. Pierson was Vice President and Treasurer of the company in 1840, and was commissioned by the directors to go to England in the summer of that year for the purchase of the first rails for the road (no T rails having as yet been rolled in this country) although that rail was the invention of Robert L. Stevens, an American.

"Mr. Pierson succeeded so well in his negotiations that he secured a large share of the iron in exchange for the stock of the company at par, although it was going begging in this country at $1 a share. This was the first Erie stock placed abroad, and as this block was entirely wiped out, with the rest of the original Erie stock in the reorganization in 1845, the Erie's first rails were obtained at a great bargain, the chief cash cost of them being the $4,000 the company paid to Henry L. Pierson, as an acknowledgment of his success in buying the rails.

THE PIERSONS AS THE PIONEERS AND PRINCIPAL PROMOTERS OF THE ERIE RAILROAD.

From the very beginning of the Erie Railroad enterprise, down to the close of the first half century of its existence, various members of the Pierson family have been identified with the project, but the most active and most successful of all during the early years of its history, was Henry L. Pierson. His honeymoon was the happy incident which had an important bearing on its inception. He was married in the latter part of 1830, and reached Charleston, S. C., just about the time of the completion of the first few miles of the Charleston and Hamburg Railroad, described in Chapter II of this work.

Mr. Pierson had been impressed years before with the ideas of his brother-in-law, Eleazer Lord, regarding some means of inland transportation from New York City to the great lakes, but the matter still remained an unsolved problem. This trip of Henry L. Pierson behind a locomotive on a railroad in far away South Carolina, however, convinced him that the question of motive power on railroads was.settled. He returned home enthusiastic over the subject, bringing the first news of the railroad opening at Charlestown. His brother-in-law, Eleazer Lord, became quite interested, and was soon convinced that this means of transportation was practicable for New York State, and he made his plans accordingly. A full account of which is given in the history of the Erie Railroad. To Mr. Pierson, however, belongs the credit of solving the problem, and he and his brother-in-law worked hand in hand to carry forward this stupendous undertaking."

Probably the greatest service rendered by Henry L. Pierson in this direction was in 1840, while holding the position of Vice President and Treasurer of the Erie Company. In that year he was commissioned by the directors to go to England and purchase the iron rails, the first used by this road. These were the old-fashioned solid rails used before the invention of the T rails by Robert L. Stevens, one of the famous inventors of steamboat and railroad equipments, of which the Stevens family of Hoboken, can claim the principal share.

English capitalists and business men had already become quite enthusiastic over railroads, and Mr. Pierson was able to negotiate a sufficient number of shares of Erie Railroad stock at full par value, in payment for the rails. Although the stock had declined somewhat about this time it was believed that the securing and laying of these, the first rails, would give an impetus to the enterprise, and that the stock would rise in proportion. The directors of the company showed their appreciation of Mr. Pierson's business sagacity, and rewarded him accordingly.

Jeremiah Halsey Pierson, the father of Henry L., was equally enthusiastic with the latter, and also with his son-in-law, Eleazer Lord, in the founding and promoting of the Erie Railroad. He

Henry L. Pierce

was one of the most enterprising and far-seeing men of the period in which he lived. He with his brothers, Josiah, Gilbert and Isaac Pierson, in the latter part of 1700, purchased several thousand acres of land in the Ramapo Valley in what is now Rockland county, New York, and established the first great manufacturing enterprises in the southern part of the State. The whole of that part of the country was then a wilderness. Utilizing the water power of the Ramapo River, they established steel furnaces, rolling mills, wire and nail factories, and also a large cotton mill. The first wood screws ever turned by machinery were made in the Pierson factory at Ramapo. This part of the business was sold at a later period to Providence (R. I.) parties, and was merged into the American Screw Company. The first steel files made by machinery were also the product of the Ramapo plant, and the inventive genius of the Piersons; this part of the business was also transferred to Providence. The Hon. Jeremiah H. Pierson was the manager and director of the Ramapo works, and the immense enterprises that grew out of these was due to his energy, business sagacity and mechanical genius. Like the patriarchs of old he governed and controlled his great army of employees, taking a fatherly interest in their welfare, and providing for their education and spiritual development. He aided materially in the business affairs of the Erie Railroad Company, and constructed several miles of road through Rockland county. His name appears among the list of directors for several successive years, until advancing years compelled his retirement. He was a just and generous man and exerted an influence for good over all with whom he came in contact. He was a judge of Rockland county and represented his district in the 17th Congress, 1821, during the administration of John Quincey Adams. He lived to a ripe old age and died beloved and honored not only by the people among whom he had so long resided, but by all who knew him. His only daughter, Elizabeth, was married to Eleazer Lord, the principal founder and first President of the Erie Railroad Company.

Henry L. Pierson, to whom reference has already been made, as one of the pioneers of the Erie Railroad, was the son of Jeremiah H. Pierson, and was born at Ramapo, Rockland county, N. Y., Aug. 15th, 1807. He had a good education and was a man of marked ability. At the age of 19 he was appointed by Governor DeWitt Clinton to conduct the survey of a route for a State road between the Hudson River and Lake Erie. The Canal Commissioners were opposed to any road, as they feared such a highway would interfere with the traffic of the Erie Canal. The route selected was difficult and impracticable, and Mr. Pierson made a vigorous protest against the adoption of the report, but to no avail, and the commissioners were insistent. Mr. Pierson continually and openly opposed it, and it was probably due to his efforts and determined opposition in a great measure that led to the preliminary steps for the construction of the New York and Erie Railroad; and he was one of the Examiners who investigated the proposed route with a view of reporting as to the advisability of changing the route from Sullivan county, N. Y., to the Delaware Valley. Mr. Pierson was a man mature beyond his years, and showed such executive ability and business sagacity, that at the age of 21 he succeeded his uncle Isaac as a member of the firm of J. G. Pierson and Bros., and gave his entire attention to the business of the New York firm. Reference has already been made to the trip he made to England in 1840 to purchase rails for the Erie Railroad. He made a second trip in 1865, and succeeded in negotiating a loan of £800,000 for the company on advantageous terms, at a time when the Erie Company was in great straits for money. With the exception of his brother-in-law, Eleazer Lord, he is entitled probably to more credit for services rendered the company than any other man. After the death of his father, Dec. 12, 1855, he purchased the interest of the other heirs and became sole proprietor of all the Ramapo property, and settled there. By his wife, Helen Maria Pierson (daughter of Isaac Pierson) he had issue: Henry L., Jr., Edward F., George B., Helen M. (married to William C. Hamilton), Sarah E., Charles T. (deceased), J. Fred, Isaac C. (died in infancy).

Lieut.-Colonel Henry L. Pierson, Jr., eldest son of Henry L. Pierson, Sen., and Helen Maria Pierson, was born in New York City, Sept. 3, 1831, his birth being contemporaneous with the founding of the Erie Railroad. Although not an active participant in its management, he virtually grew up with it, watched its progress with the most intense interest, and was familiar with its early struggles and difficulties until its final completion. During his long and useful life he has witnessed the introduction and development of the greatest inventions in the world's history, and is one of the important connecting links between the past and present periods. He was educated with a view to a business career, which he has assiduously followed for more than half a century, as a member of the firm of Pierson & Co. In the great crisis of the nation's history—the war between the states—he was among the first to respond to President Lincoln's call for troops. As a member of New York's famous Seventh Regiment, he went with it to Washington on the 19th of April, 1861, and continued in service in various capacities until the close of the war. He became Adjutant of the 141st Regiment, New York Volunteers, later commissioned Captain and Assistant Adjutant-General. He was on the staff of Brig.-General James Bowen (who was the second President of the Erie Railroad), and later he was appointed Lieut.-Colonel of the 2nd Regiment, New Orleans (La.) Infantry. He was brevetted a Lieut.-Colonel by the State of New York.

He married Henrietta, youngest daughter of Hon. David Haines, who was twice Governor of the State of New Jersey, and judge of the Supreme Court of that State for sixteen years.

General J. Fred Pierson, youngest child of Henry L. and Helen Maria Pierson, was born in New York City, Feb. 25, 1839. He received a thorough education, and from early childhood was familiar with the great railroad enterprise in which his father and grandfather were prominent factors, and he also was a member of the Board of Directors of the New York and Erie Railway Company for a number of years. As a young man he had a remarkable military career in the service of his country during the Civil War. At the time of President Lincoln's first call for seventy-five thousand men, young Pierson was a member of the Seventh Regiment of New York and was detached to serve as Captain and Aide-de-Camp on the staff of Gen. W. H. Hall, commanding the Brigade of which the Seventh Regiment formed a part. He went to the front on May 26, 1861, as Captain of H Company, First Regiment of Volunteer Infantry, State of New York, and on July 20, 1861, he was promoted Major, and in less than two months from that time—Sept. 10, 1861, he was made Lieut.-Colonel, and on Oct. 9, 1862, he was commissioned Colonel of his regiment, and on March 15, 1865, he was brevetted Brigadier-General of U. S. Vols. He served in Berry's Brigade, Kearney's Division, attached to Hooker's Corps. From the very beginning he was in constant active service, always on the fighting line. He was engaged in the battles of Big Bethel, Hampton Roads, Fair Oaks, Peach Orchard, Glendale, Charles City Cross Roads, Malvern Hill, Second Bull Run, Chantilly, Fredericksburg 1st and 2nd, and Chancellorsville. He was wounded during the battle of Glendale, Va., June 30, 1862, and at the battle of Chantilly, Sept. 1, 1862, he was captured by the enemy and confined for several months in Libby Prison. During the battle of Chancellorsville, May 1, 1863, he was shot through the chest and severely wounded, but continued in command of his regiment without leaving the field. Soon after this he returned to New York with his regiment, whose term of service had expired. On his arrival in the city his regiment was received with distinguished honors, both military and civil, and a grand banquet given in its honor. At a war meeting held at Cooper Institute, Dec. 3, 1863, he was appointed Commissioner to visit the Army of the Potomac for the purpose of procuring enlistments from those regiments whose terms of service had expired, or was about to expire. In this he rendered very important service to the government and to the whole country. During the invasion of Pennsylvania by Lee's army in 1863, he accompanied the New York Militia to Harrisburg, serving under his old commander, Gen. William H. Hall as Chief of Staff, and Quartermaster of Third Brigade, N. Y. S. M. He continued in this service for sixty days until the invaders were driven out of Pennsylvania into Virginia. His old commanders testified to his gallant and distinguished services on the field, as well as to his capacity as an officer and disciplinarian. Gen. S. B. Hageman, commander of the Brigade to which he was attached, wrote: "Perhaps no Colonel has more fully illustrated the capacity to enforce discipline than yourself through energy as well as physical courage; and even in this noted Division it would be difficult to name your equal as a tactician." Gen. Berry in a letter dated Dec. 29, 1862, said: "I am happy to say that through your exertions the First Regiment is a model of discipline; the men are happy and contented, and efficient to a high degree, and I consider the regiment one of the best in the service."

Gen. Pierson commanded the first volunteer troops sent by the State of New York to the war, and he was undoubtedly the youngest officer of his rank in any army, at times commanding a brigade, at the age of twenty-three. While a strict disciplinarian he was greatly beloved by all those who served under him, and enjoyed an unusual degree of popularity in military circles.

At the close of the war he entered his father's firm, and in 1866 was made a partner .

He is President of the Army and Navy Club of the City of New York, a member of New York Commandery of the Military Order of the Loyal Legion, U. S., and also a member of Washington Post, G. A. R.

CHAPTER VI

CHEMUNG RAILROAD; BUFFALO AND ERIE; BUFFALO AND NIAGARA; ATTICA AND HORNELLSVILLE; BUFFALO AND ROCHESTER; BUFFALO AND NEW YORK CITY; BUFFALO AND STATE LINE; BROOKLYN AND JAMAICA; HUDSON RIVER; NEW YORK AND NEW HAVEN; NEW YORK CENTRAL; BOSTON AND ALBANY; NEWBURGH BRANCH OF NEW YORK AND ERIE; PLATTSBURG AND MONTREAL; WILLIAMSPORT AND ELMIRA; CANANDAIGUA AND CORNING; SACKETTS HARBOR AND ELLESBURG; UNION, ALBANY, VERMONT AND CANADA; TROY UNION AND BENNINGTON; ROCHESTER AND GENESEE VALLEY; SYRACUSE, BINGHAMPTON AND NEW YORK, RUTLAND AND WASHINGTON; FLUSHING; SARATOGA AND WHITEHALL; ATLANTIC AND GREAT WESTERN; BUFFALO, BRADFORD AND PITTSBURG; BUFFALO AND NEW YORK CITY.

THE CHEMUNG RAILROAD

Which became a part of the Erie system, was incorporated May 14, 1845; the commissioners appointed to procure subscriptions being Charles Cook, William Maxwell and Lyman Covell. Not much was done at that time.

BUFFALO AND ERIE RAILROAD

A local history of Erie county says: "In 1836 we had but a single railroad running into Buffalo—that from Niagara Falls—of not less than twenty miles in length, with no connection whatever with any other road.

"Out of the wreckage of the period of disasters came the first steam railroad in Erie county. Besides the Buffalo and Black River Road two railroads were incorporated as early as April, 1832, neither of which, however, constructed its proposed lines. One of them was the Buffalo and Erie Railroad Company, which proposed to build a road seventeen miles long to East Aurora. Considerable stock was subscribed, and the line was surveyed. In the midst of the most hopeful anticipations came the crisis of 1836, and the project was abandoned.

"THE BUFFALO AND NIAGARA RAILROAD COMPANY

Was another product of the inflated period, and when the first ominous signs of the crisis were seen in 1836, the road was in process of construction. On the 26th of August of that year the first steam locomotive in the country was placed on this road at Black Rock, and ran from there to Tonawanda at a speed of fifteen to twenty miles an hour. On the 6th of the following month its trips were extended to Buffalo; and on the 5th of November were running regularly to the Falls."

ATTICA AND HORNELLSVILLE RAILROAD

This company was incorporated May 14, 1845, with a capital of $750,000. Time extended April 11, 1849. Other roads allowed to take stock April 9, 1851. Capital increased and company allowed to purchase the Buffalo and Rochester Railroad from Attica to Buffalo, and to change its name March 3, 1851. Name changed to Buffalo and New York City Railroad April 16, 1851.

BUFFALO AND ROCHESTER RAILROAD

This company was formed by the consolidation of the Buffalo and Attica Railroad Company, which had constructed a road from Attica to Rochester, and in 1862 opened a new direct line from Buffalo to Batavia, and sold its line from Buffalo to Attica to the New York and Erie Railroad Company. The latter leased their line to the New York and Erie Company, which built a branch from Attica to Hornellsville, thus forming a continuous line from Buffalo to New York; the whole line was ready for traffic in 1852.

BUFFALO AND NEW YORK CITY RAILROAD

This company the same year opened a line of road from Batavia, near the line of the Central Railroad, thence southward to Avon; thence southward to Corning. In a short time, however, the trial between Buffalo and Batavia was taken up while the line beyond Batavia went under contract elsewhere.

BUFFALO AND STATE LINE RAILROAD

This company was formed June 6, 1849. The road was opened from Dunkirk to the State Line January 1, 1852; and to Buffalo 22d of February following. The company purchased the North East (Penn) Railroad under act of April 13, 1857, and later formed one company from Buffalo to Erie, Penn., which was opened under the name of Buffalo and Erie Railroad.

BROOKLYN AND JAMAICA RAILROAD

This was one of the earliest companies formed in the southern portion of the State. It was chartered in 1832, and was opened from the South Ferry to Jamaica, a distance of about twelve miles in 1836; and not long after the Long Island Railroad, chartered April 26, 1834, ran cars over the same track, reaching some of the towns in Suffolk county. The route was along Atlantic street, and what is now Atlantic avenue. Although this road was a great advance on all previous modes of travel, its value as a means of local travel was limited to the immediate vicinity of the street through which it passed, and it served even this need imperfectly. The equipment, even at that period, was not by any means up to date. The best locomotive on the road at that time seldom exceeded a speed of twelve miles an hour, and the Long Island Railroad having no competition to fear, was not then, nor for many years after, equipped in the best manner. "More than twenty years later," says a local writer, "in its passage through Atlantic avenue, an active boy or man found no difficulty in keeping up with its express trains for two or three miles."

Although chartered in 1834 the main line was not opened for travel through to Greenpoint until July, 1844. It was designed to be a direct route between New York and Boston by connecting at the eastern end of Long Island with a line of steamers for the main land. But the competiton of the New Haven all-land route diverted the through travel. The Brooklyn and Jamaica Railroad leased, from its completion in 1836, extended its line to the South Ferry in Brooklyn. The new line to Long Island City having been completed in 1861, the line in the city of Brooklyn was abandoned, but rebuilt some years later as far as the intersection of Flatbush and Atlantic avenues.

The road was not a financial success, and was for some time in the hands of a receiver, but subsequently revived, and with additional capital and other management, it became a paying enterprise.

Hudson River Railroad

The construction of a railroad parallel with the Hudson River, connecting the City of New York with the City of Albany, affording a communication between the two cites at all seasons of the year, was considered an object of so much importance that, in 1833, a number of enterprising citizens of Albany obtained from the Legislature a charter for a company with a capital of $3,000,000, and permission to construct the road, but the amount of capital was not subscribed, and the project for the time was abandoned, and some twenty years elapsed before it was again undertaken. The then estimated cost for a road for a single track, was $12,000 per mile, which would amount to nearly $2,000,000 for the entire line. It was believed that branches of this road might easily be constructed to Hartford and New Haven, and a large amount of business might me expected, not only from the eastern counties of New York, but from Berkshire county, Mass., and Litchfield and Fairfield counties, Connecticut.

The failure of the first project probably discouraged any further attempt for many years, and it was not until the early part of 1846 that the matter was again revived, and this time by prominent citizens of Poughkeepsie, among whom was Matthew Vassar, D. B. Lent and N. J. Coffin. Associated with them were a few capitalists from New York and other places, who were convinced of its feasibility, its safe investment and its practical advantages as a connecting link with the commercial channels of the North and West. The first survey of the route was paid for by the people of Poughkeepsie, and it was through their influence that a charter was obtained May 12, 1846. The construction of the road was begun in 1847, and seventy-five miles were completed in 1849, which year it was in part first opened to the public. It was opened to Peekskill from New York, September 29, 1840; to New Hamburg, December 6, 1840, and to Poughkeepsie, December 31, 1849. The road was rapidly completed, and the northern section was opened from Albany to Hudson, January 10, 1851; to Tivoli, August 4, 1851; and through its entire length from New York to Albany, a distance of one hundred and forty-three miles and a half, October 1, 1851. It has 3,018 feet of tunnels, varying from sixty to eight hundred and thirty-five feet; one of which is through solid rock, just above New Hamburg, in Dutchess county.

"On the 29th of September, 1849, passage travel over the road as far as Peekskill was commenced. The average number of passengers per day for the first month (October), was 830; and the total number for the month, 21,593; and for the next month (November), the average number per day was 1,055; and the total number for the month 27,441. At this time it was calculated that the land taken for the roadway in Westchester county had cost the company, exclusive of agencies and other charges, $185,905.02; and also that the grading had involved an expenditure of not far from a million dollars, which was about three hundred thousand dollars above the cost estimated in the original contracts in 1847."

The Vanderbilt influence came into control of the New York and Hudson River Railroad in 1864, but the road between New York and Albany was operated independently of the Central Railroad until 1870, when, in accordance with the legislative act of November, 1869, authorizing a consolidation of the whole interest between New York, Buffalo and Suspension Bridge, the consolidated organization assumed the title of the New York Central and Hudson River Railroad Company. The Hudson River Railroad cost to build and equip $78,014,954—or $76,272 per mile.

NEW YORK AND NEW HAVEN RAILROAD

The Hartford and New Haven Railroad had been in operation for some years before serious thought was given to a land connection of New York with New Haven by rail. Steamboats were running regularly between these cities, and the need of railroad communication was not felt.

In 1844 public sentiment had changed, and the Legislature of Connecticut, on application, granted a charter, and soon after application was made to the New York Legislature for permission to run to New York City, but failed on account of the strong opposition of the Harlem Road and of the Westchester Turnpike Company. An agreement was finally reached with the Harlem Road almost on its own terms, in 1846, and later with the Westchester Turnpike Company. In May, 1846, the New York and New Haven Railroad was authorized to join with the Harlem Road at or near William's Bridge.

In 1846 a contract was made with Messrs. Alfred Bishop, Mr. G. L. Schuyler and Mr. S. G. Miller. Mr. Schuyler subsequently transferred his interest to Mr. Bishop. By Dec. 31, 1848, the whole of the capital stock was subscribed. By the spring of the following year the line had been located and approved by the commissioners.

The line adopted was in the main that surveyed by Professor Twining, except from the Harlem Junction to New Rochelle, the entrance into Bridgeport, and the entrance to New Haven. Professor Twining's line was run to a point on the western edge of the head of the harbor, and from thence was indefinite, except that it contemplated crossing the harbor and the canal basin on piles, and running along the shoal waters to the Hartford Road.

The cost of the road and equipment entire was $2,701,879.13, exceeding the original estimate by a very large amount. The fares were made very low: $1.50 from New Haven to New York, and fifty cents from Bridgeport on account of the steamboat competition. It continued in a prosperous condition, however, for some years until overtaken by two great disasters, one following the other. The first was known as the "Norwalk Disaster." On the 6th of May, 1853, a train heavily laden with passengers plunged through an open draw into the Norwalk River. Forty-five passengers met instant death, and many more were seriously injured. The heavy claims for damages prevented the payment of the dividend for that year, which the earnings would have warranted. The several claims were settled amounting to $252,311.50, and the report for 1854 showed only two or three still in litigation.

When again everything looked promising for the company, the whole country was startled by the report of a defalcation by one of the most trusted officers of the company, whose name hitherto had been above reproach.

The suspension of the dividends in consequence of the Norwalk accident had caused a fall in the stock of the road in 1854, from 85 on June 23, to 79 on July 1, and to 67 on July 3. An examination of the books showed that stock to the amount of $1,000,000 had been issued by the banking firm of which the President of the road was a member, and by it pledged as collateral to raise money. There had been no check upon the President except his honor, and the non-payment of dividends gave him the opportunity to issue certificates in unlimited quantities without exciting suspicion. On July 3, 1854, he wrote a letter to the Directors, resigning his office, calling attention to the condition of the books, saying that much would be found there wrong, and excusing his brother (his partner) of all blame. He disappeared from New York and is supposed to have died abroad.

In order to restore its credit as a result of these irregularities, the company, in 1855, was empowered to issue $3,000,000 of mortgage bonds for the purpose of retiring the old bonds, and securing and paying just claims. In the same year the Directors of the road were authorized, for the purpose of adjusting the claims against the company incurred through the transactions of their President to increase the capital stock to an amount not exceding the sum of two million dollars. In 1857 arrangements were made with the New York Central Railroad Company and the New Haven Railroad became a part of that extensive consolidation of several roads.

New York Central Railroad Company

This corporation was formed by consolidating several railroads already in operation, and some projected roads between Albany, Troy and Buffalo and Niagara Falls. The act following the consolidation was passed April 2, 1853, and was carried into effect the 17th of May following. The consolidated capital amounted to $23,085,600, and debts were assumed to the amount of $1,947,815.72. The following is a list of the roads which came under the first organization, with the date of charter of each road:

Albany and Schenectady	1831
Utica and Schenectady	1835
Syracuse and Utica	1839
Auburn and Syracuse	1836
Auburn and Rochester	1840
Tonawanda	1836
Schenectady and Troy	1843
Rochester and Syracuse	1853
Batavia and Attica	1845
Attica and Buffalo	1845
Rochester and Buffalo	1859
Rochester and Lockport and Niagara Falls	1852
Niagara Falls and Lewiston	1854
Lockport and Tonawanda	1853
Rochester and Charlotte	1853

When the project of consolidation was under consideration the stocks rose rapidly to high premiums, and the principle of consolidation was to create a scrip stock to the amount of the aggregate premiums, and divide the *pro rata* among the stockholders of all the companies. That scrip to the amount of about $8,100,000 was figured as a part of the cost of the road. The road was straightened so as to make the direct line only 298 miles from Albany to Buffalo, but the other lines and routes added to it make a total of 594 miles. The capital stock of the company on September 30, 1868, was $28,780,000, and there was an indebtedness of $11,520,000, mostly in bonds. The total earnings of the road in 1854, the year of the consolidation, was $5,918,332. From this sum they had risen in 1857 to $8,027,253, but receded to $6,200,000 in 1850. From 1865 to 1868 inclusive they had averaged $14,350,000 per annum. In 1869 a stock dividend of 84 per cent., amounting to nearly $24,000,000, was declared under the plea that the surplus earnings had accumulated, and the stock had amounted to nearly fifty-three million dollars, and was consolidated with the Hudson River Railroad; the united capital of the two being called seventy-five million dollars; though the actual cost never exceeded forty-five million dollars. The net earnings of the consolidated roads in 1869 was about seven million dollars.

Boston and Albany Railroad

Though not a New York corporation, the connections of this road form a part of the great railroad system that has contributed so largely to the wealth of the Empire State, and assisted in developing its towns, cities and villages along the line of its route. The charter of the road is dated March 5, 1833. The road runs from Worcester, 44 miles west of Boston, to the Massachusetts State line, and thence 38 1-4 miles over the Albany and West Stockbridge Railroad, leased and operated by the Western road into Albany, 200 miles from Boston. The first passenger train that left Boston was on April 7, 1834, for Davis's Tavern, Newton, to which place the Worcester road was then opened. It was completed to Worcester July 3, 1835. The Western in continuation was opened to Springfield, Oct. 31, 1839, and reached Greenbush Dec. 21, 1841, thus establishing the route from Boston to the Albany basin in seven hours. It then connects with the New York Central road, which carries the line 229 miles to Rochester, where, by the Lockport division of the Central road, 77 miles, connects at Suspension Bridge with the Great Western Canada road, and thus with the Michigan Central to the Illinois Central and the Ohio and Mississippi to New Orleans.

THE NEWBURG BRANCH OF THE NEW YORK AND ERIE RAILROAD

Was allowed to Newburg April 8, 1845, and opened January 8, 1850.

PLATTSBURG AND MONTREAL RAILROAD

This compnay was formed February 25, 1850, commenced running in August, 1851, and opened July 20, 1852, connecting with the Lake, St. Louis and Province Line Railroad, crossing the Ogdensburg Railroad at Mercer's Junction.

WILLIAMSPORT AND ELMIRA RAILROAD

This road was incorporated by Pennsylvania April 9th, 1850, and allowed to extend the road to the New York and Erie Railroad at Elmira. The village of Elmira was authorized to loan its credit for $100,000 toward the construction.

CANANDAIGUA AND CORNING RAILROAD

This company was incorporated May 11, 1845, with a capital of $1,500,000. Time extended to April 15, 1847, and again, March 24th, 1849. Surveys were begun in June, 1845, and the construction in 1850. The road was opened from Canandaigua to Jefferson (now Watkins) 46 74-100 miles, Sept. 15, 1851, the New York and Erie Railroad furnishing engines, cars, etc., for a specific rate per mile. The road was allowed to connect with the Chemung Railroad at Jefferson, and to change its name Sept. 11th, 1852, to Canandaigua and Elmira Railroad; it subsequently became a part of the New York Central system.